TECHNOLOGY DEPARTMENT

V.13 #153

THE INSTITUTE OF PETROLEUM REVIEW

September 1959

FIFTH WORLD PETROLEUM CONGRESS REPORT

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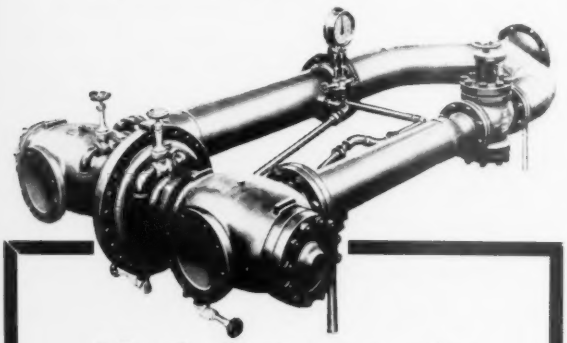

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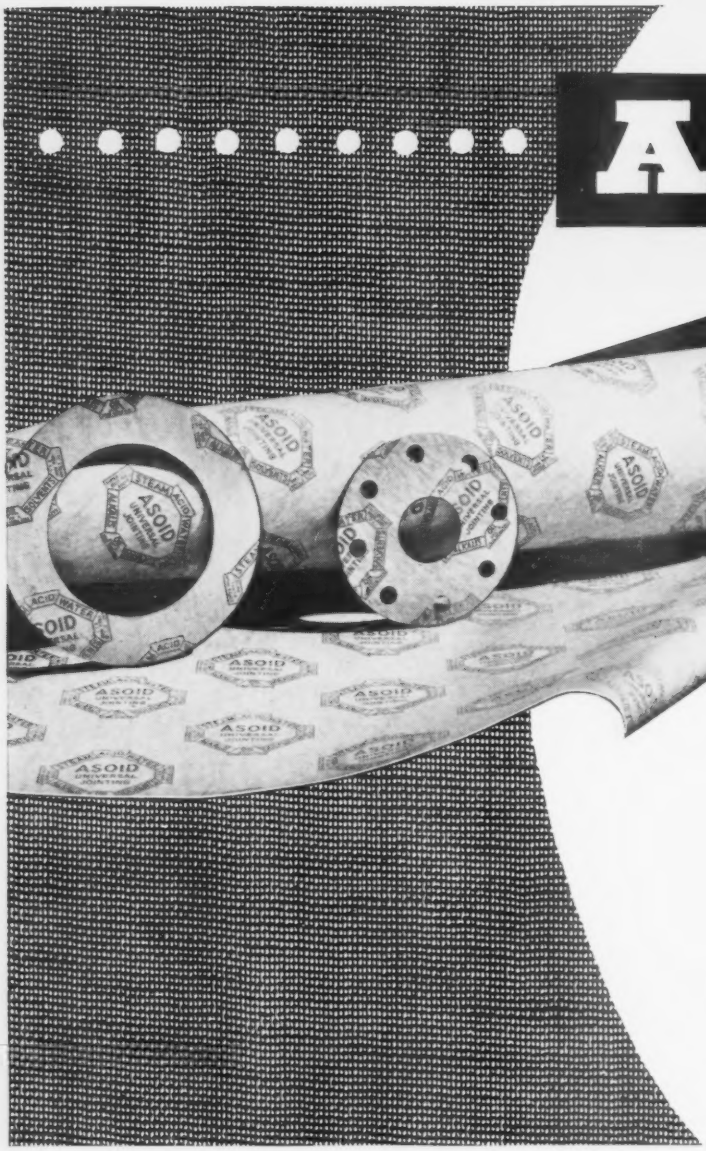

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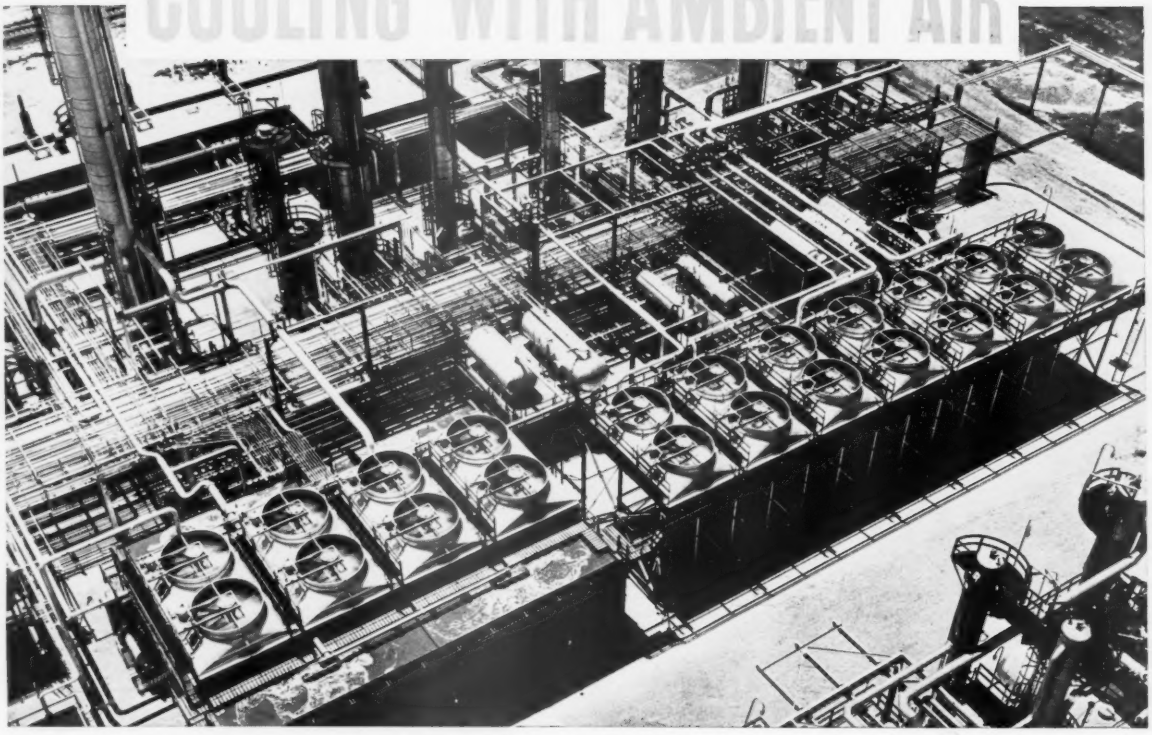

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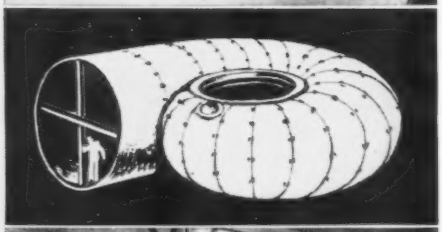

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Thousands upon thousands of miles of pipes — mild steel pipes, straights, bends, branch pipes, hydro-electric pipes, circulating water and irrigation pipes, gas mains. Pipes for the Blue Nile Dam and for Calder Hall, for a power house in Mexico and a tin mining plant in Nigeria — so the story goes on. This is just part of the contribution towards progress made by one of Britain's most progressive engineering organisations.

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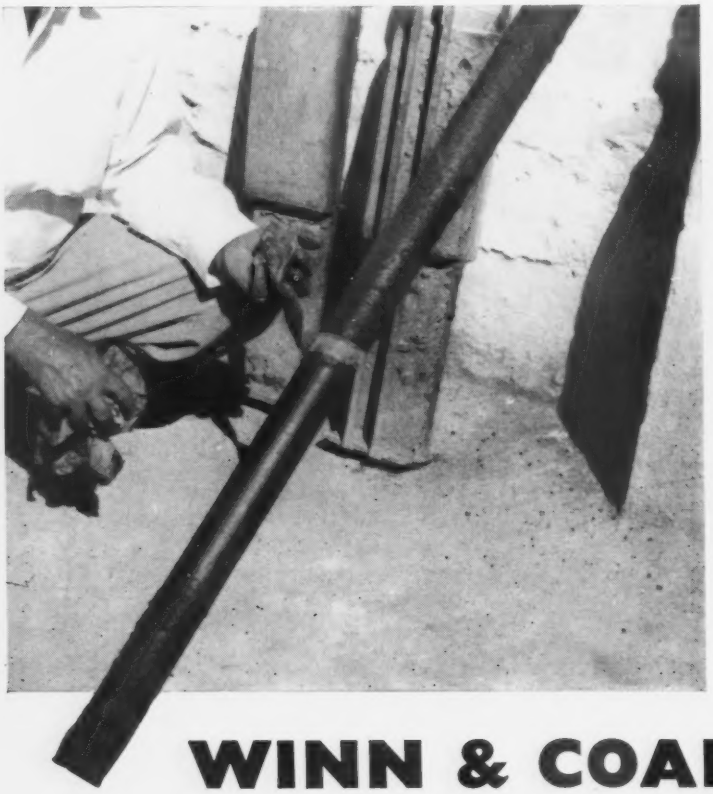

This pipe was subjected to hot salt spray for 6 months in a cooling installation. Part was left unprotected, the rest coated with Denso Paste and covered with Densyl Tape. As can be seen, the unprotected section is heavily corroded. The Denso-protected section is as good as new.

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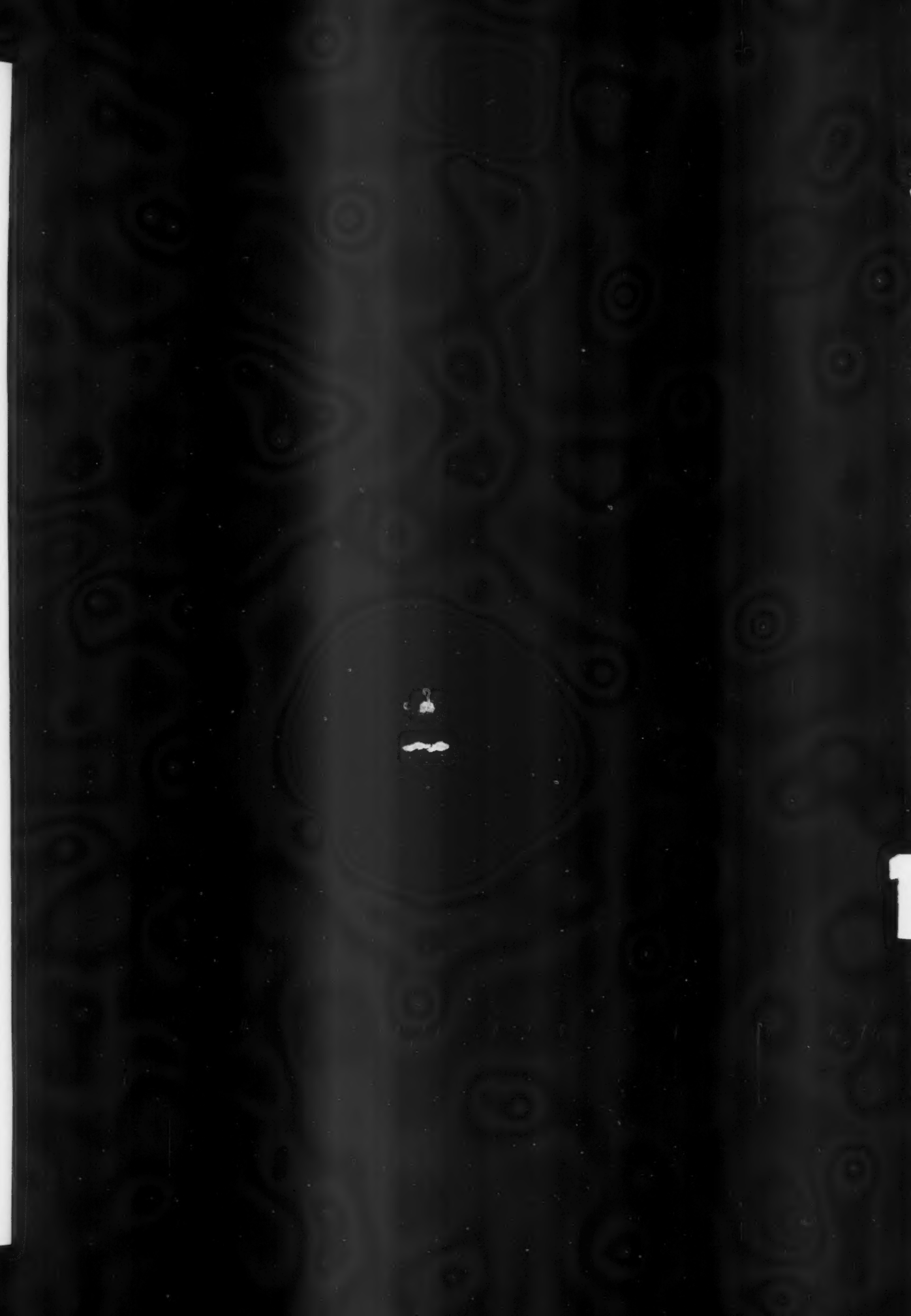

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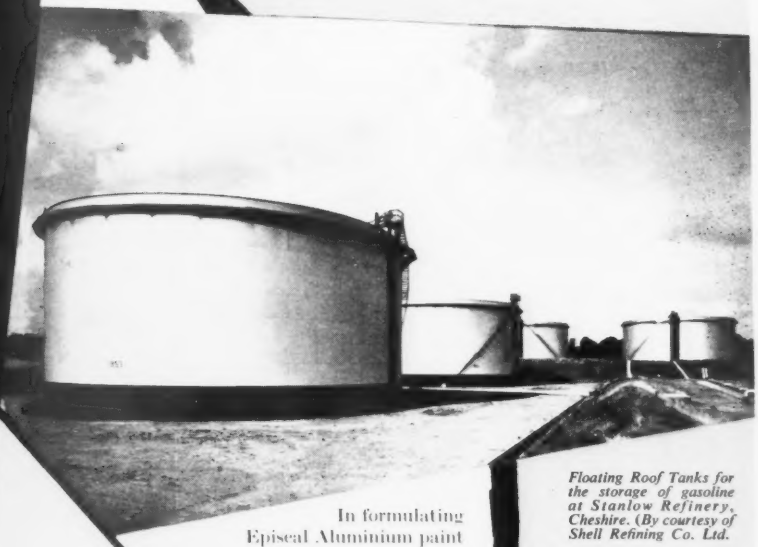
FOR THE OIL INDUSTRY



Floating Roof Tanks for the storage of gasoline at Stanlow Refinery, Cheshire. (By courtesy of Shell Refining Co. Ltd.

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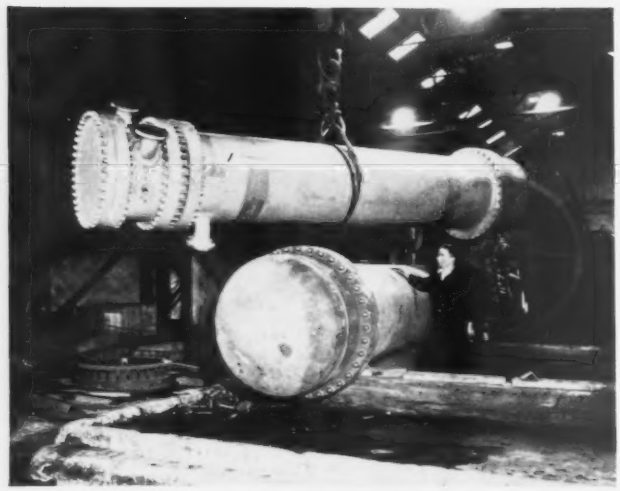

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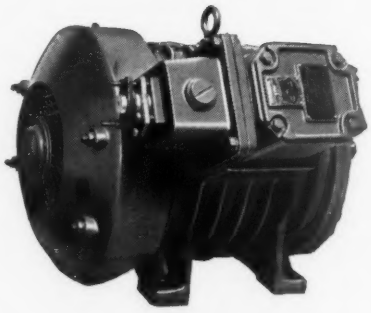

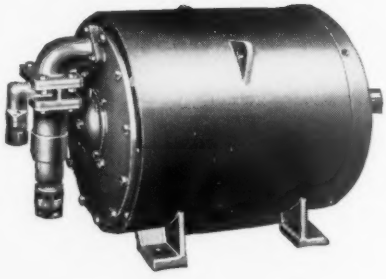

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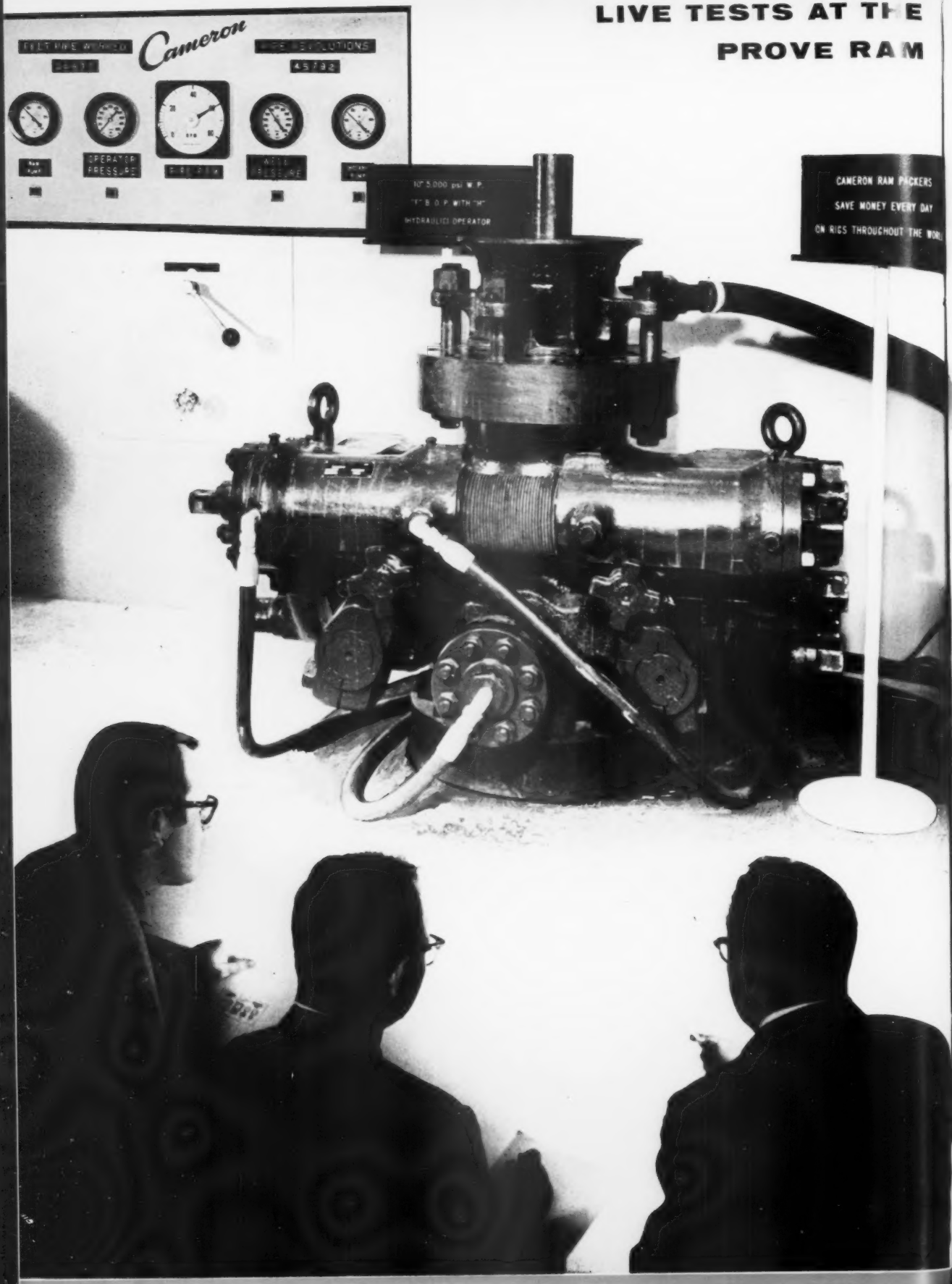

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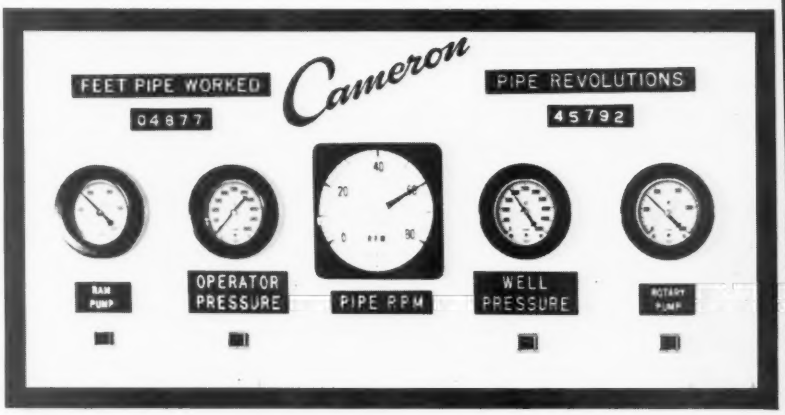

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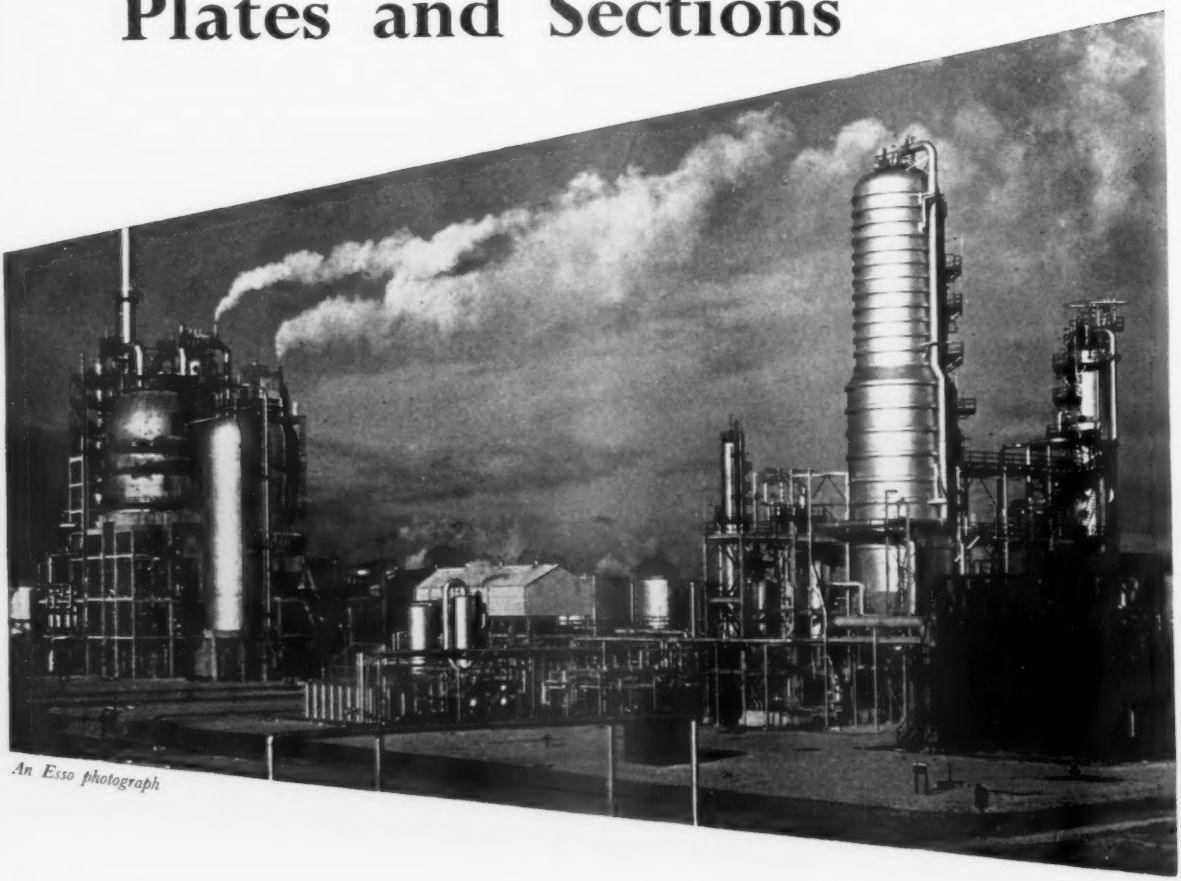

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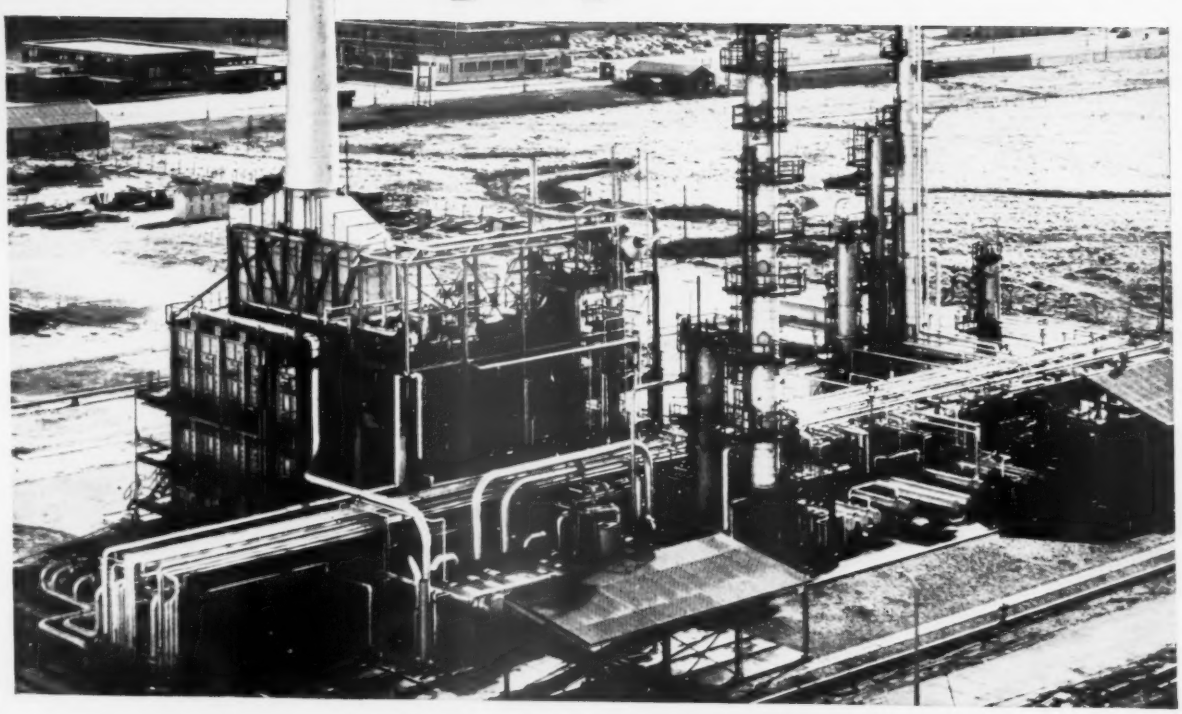

Mobil Refinery, Coryton. Photograph by courtesy of Mobil Oil Co. Ltd.

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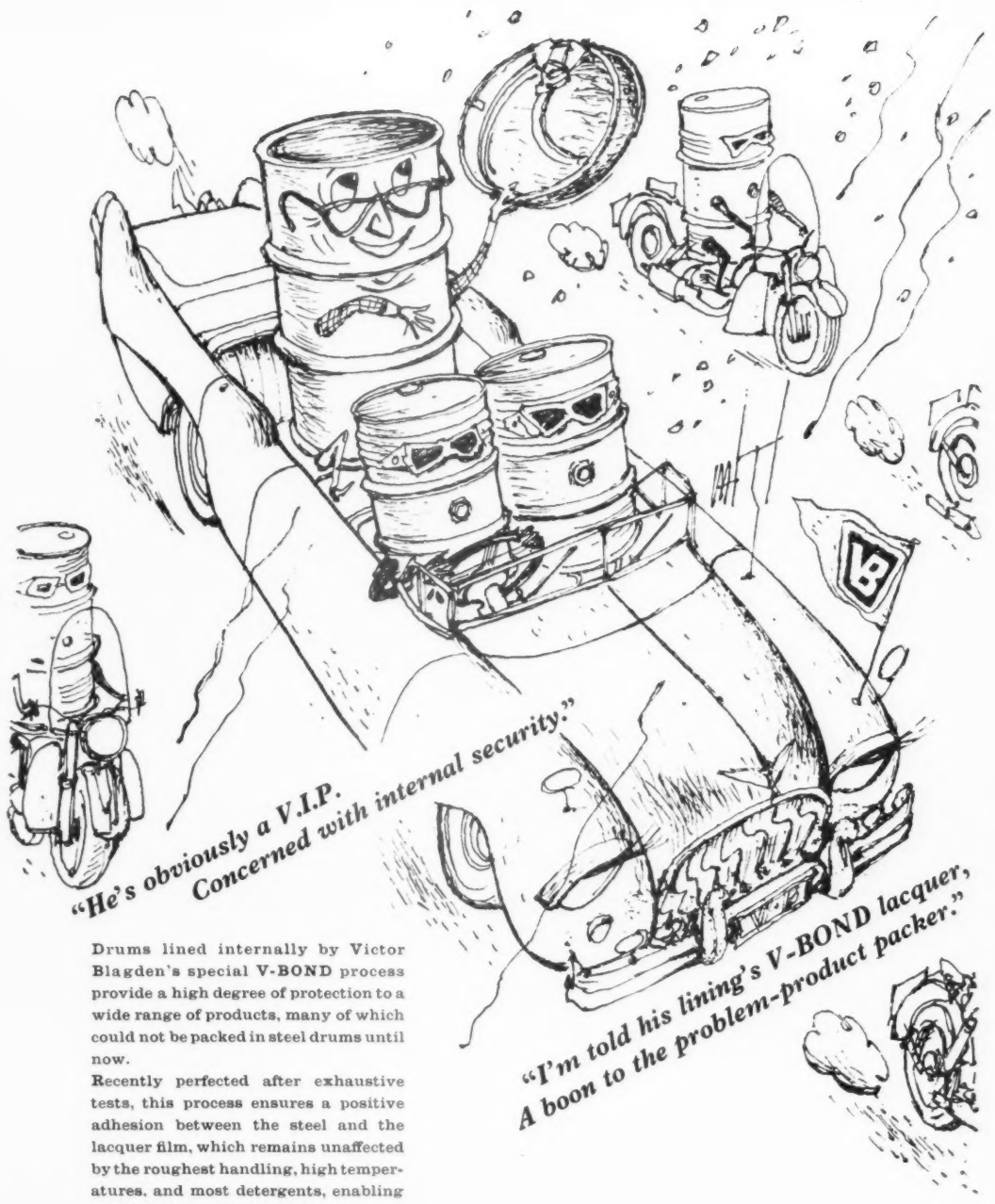
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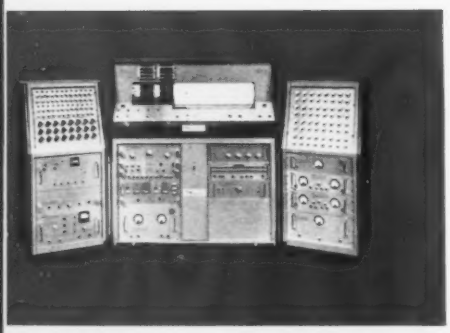

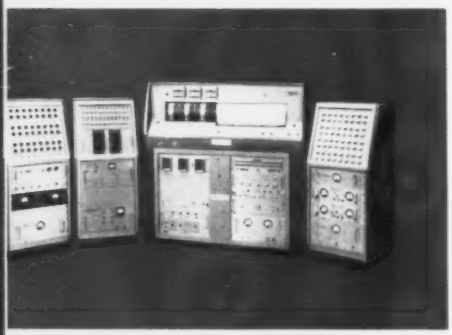

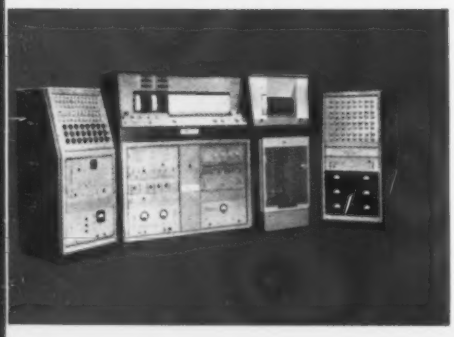

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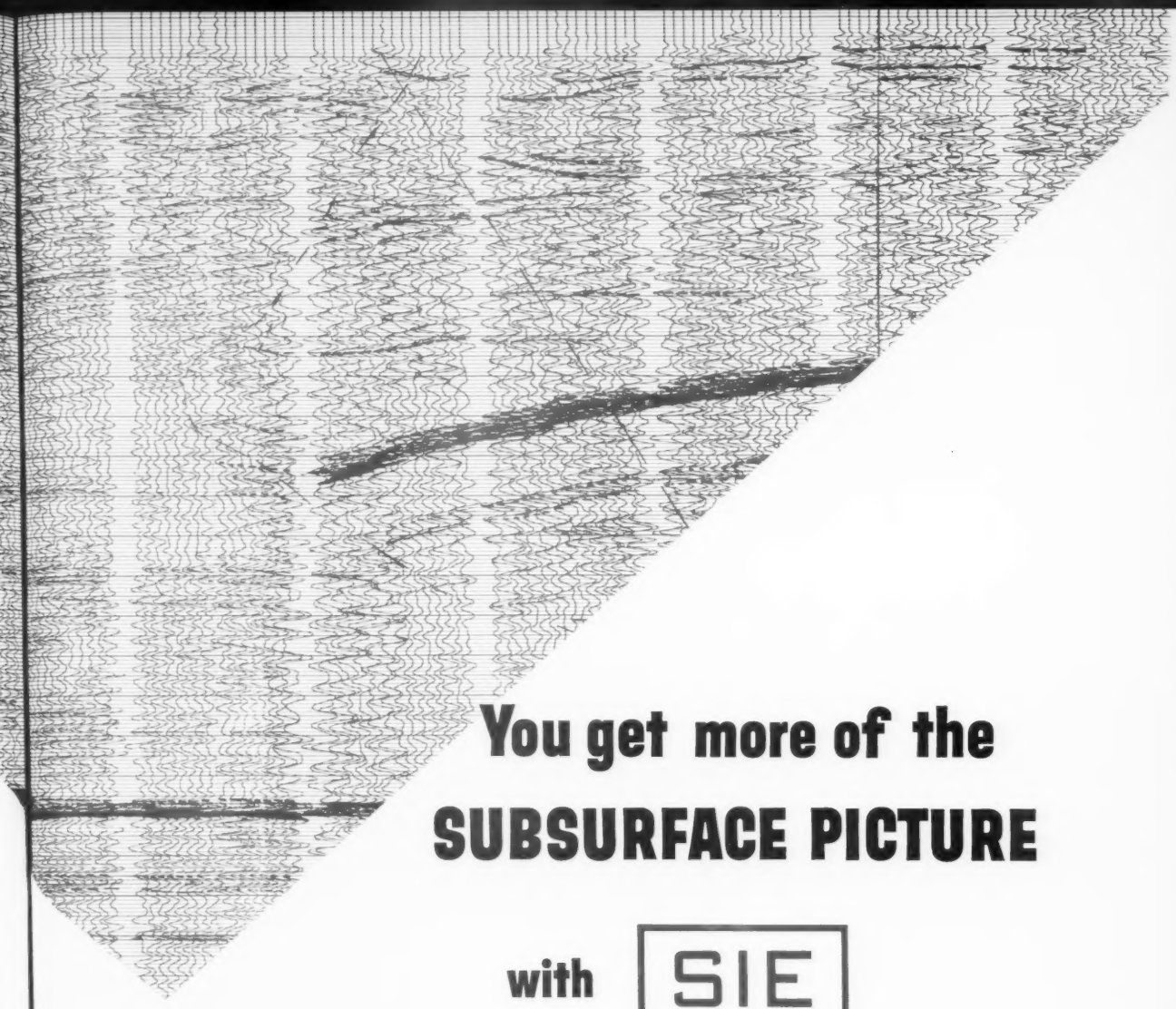

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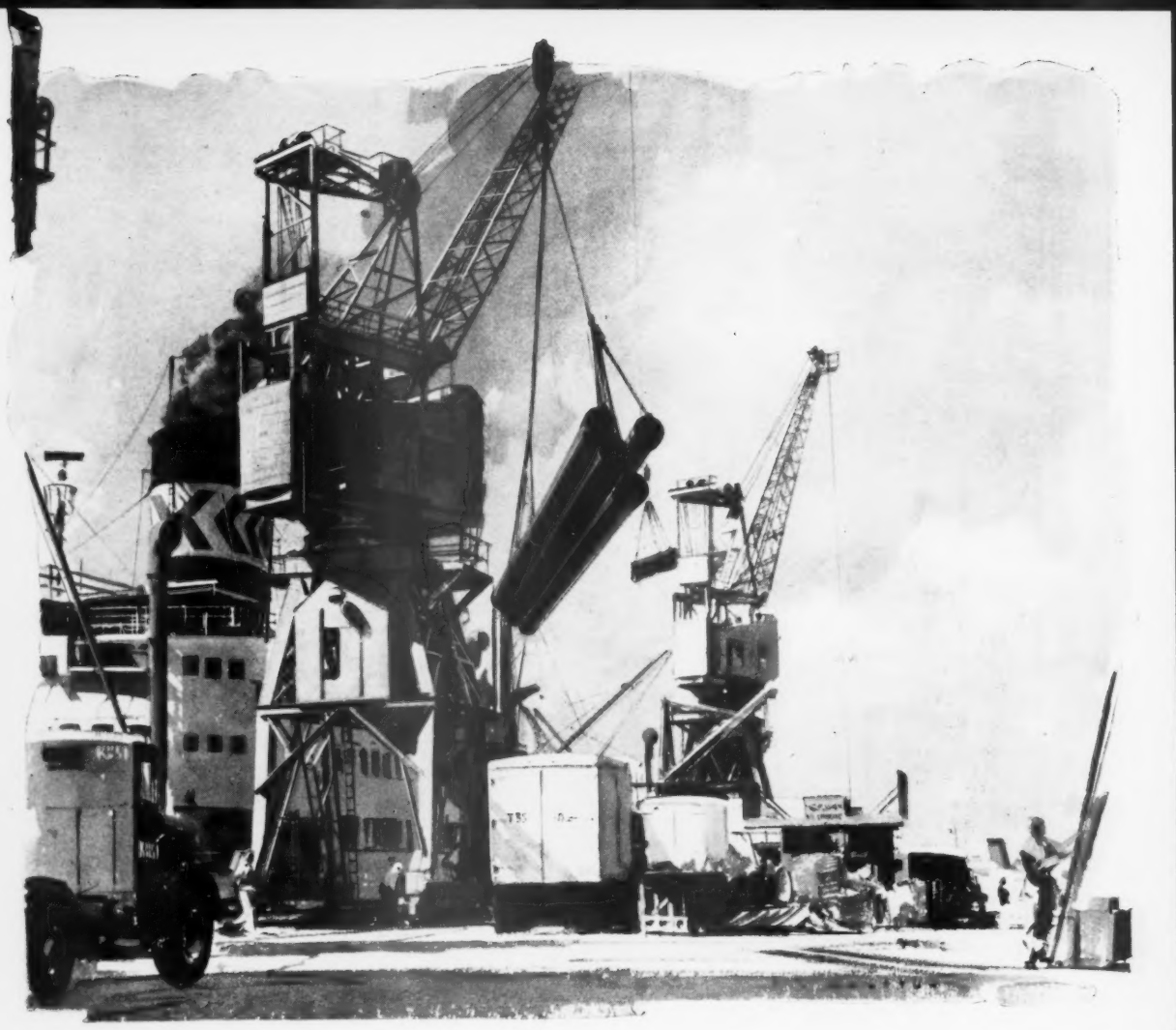
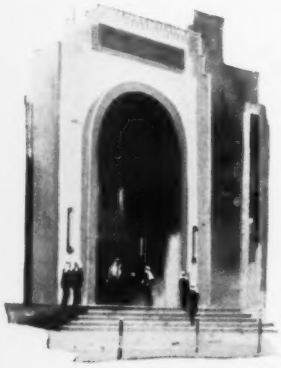


OIL COUNTRY TUBULAR GOODS

Entrance to Kuwait State Secondary School, one of the many social development projects fostered by H.H. the Ruler of Kuwait.



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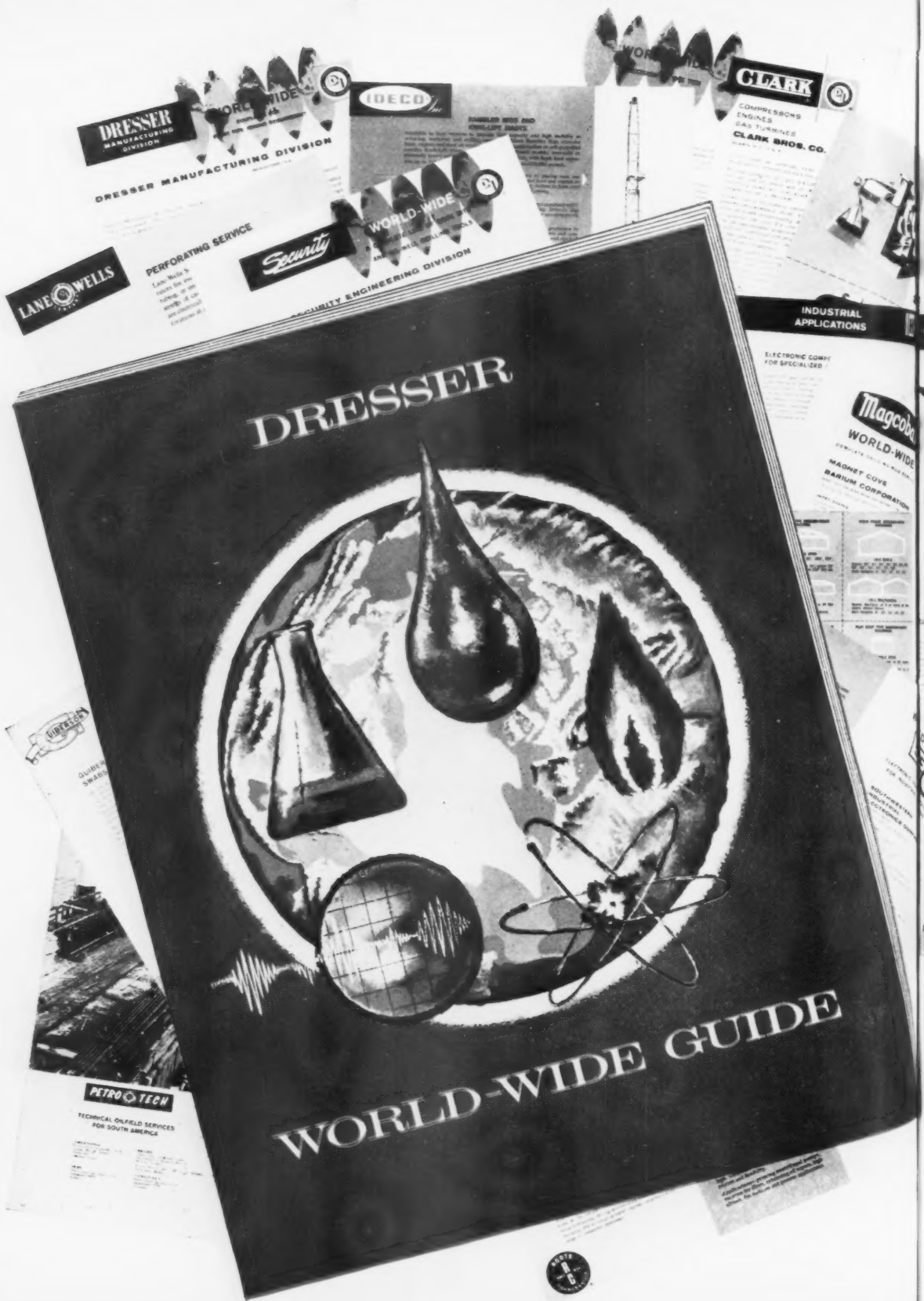
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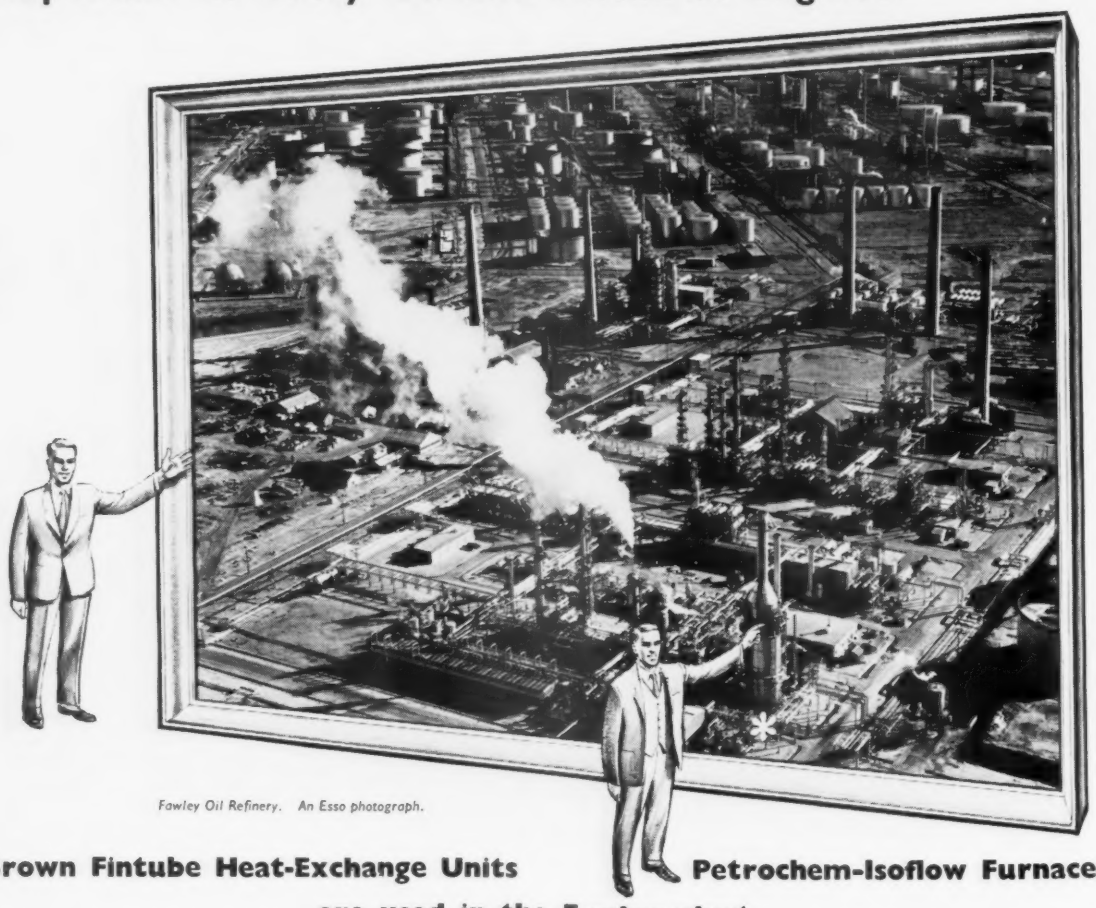

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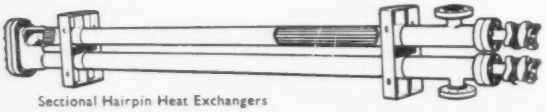

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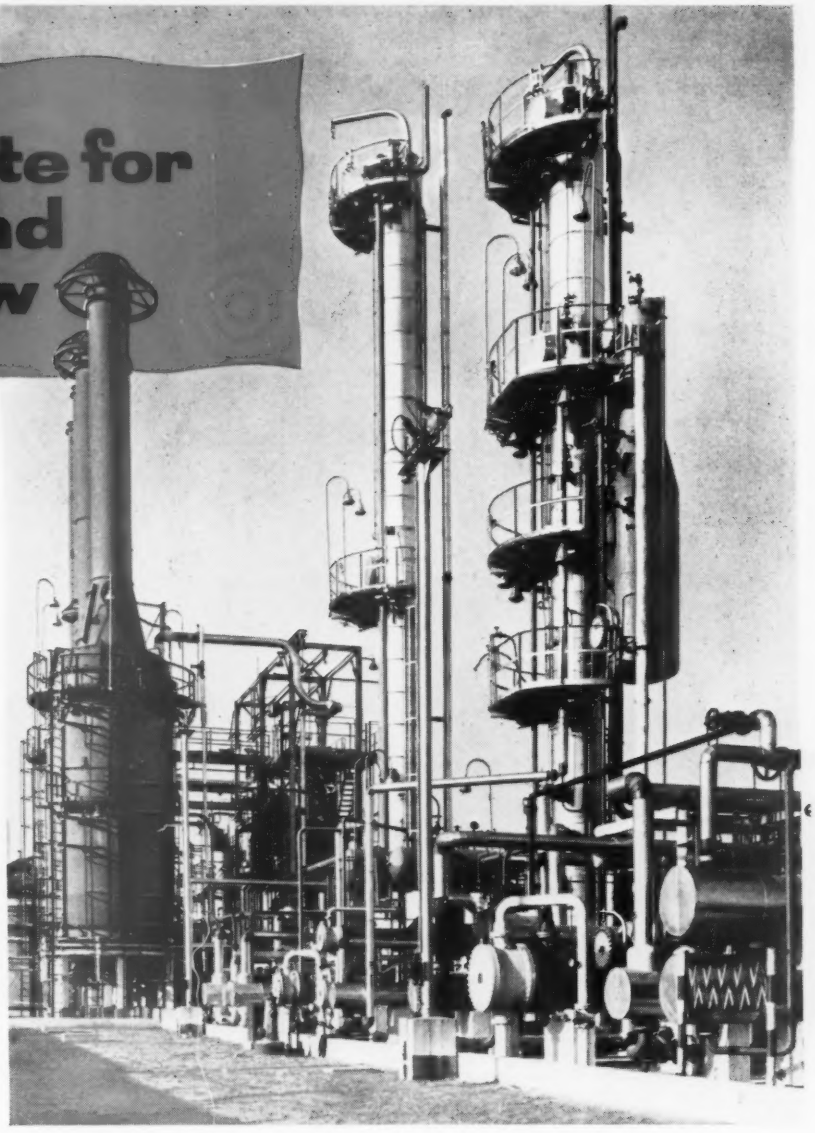

This Kellogg designed desulphurising and catalytic reforming unit, in the Antwerp refinery of Raffinerie Belge de Petroles, S.A., desulphurises 4661 BPSD of straight run naphtha over a Cobalt Molybdate Catalyst in the presence of hydrogen. The heavy fraction of 2500 BPSD is then reformed to an unleaded F-1 octane of 88, whilst the desulphurised light fraction of 2161 BPSD is routed direct to product blending. The process scheme selected permits great flexibility of operation with respect to feedstock and product specifications, and provisions are included in the design for the future production of reformate of up to 95 unleaded F-1 octane. KIC offers the refining industry a wide experience including a background of engineering eight different types of reforming processes in various sizes. Over a third of this experience has been in designing Kellogg reforming units of this type which can produce reformates above 100F-1 clear octane number. KIC engineers welcome the opportunity to outline to interested refiners the economics and operating details of Kellogg designed Catalytic Reforming Units.

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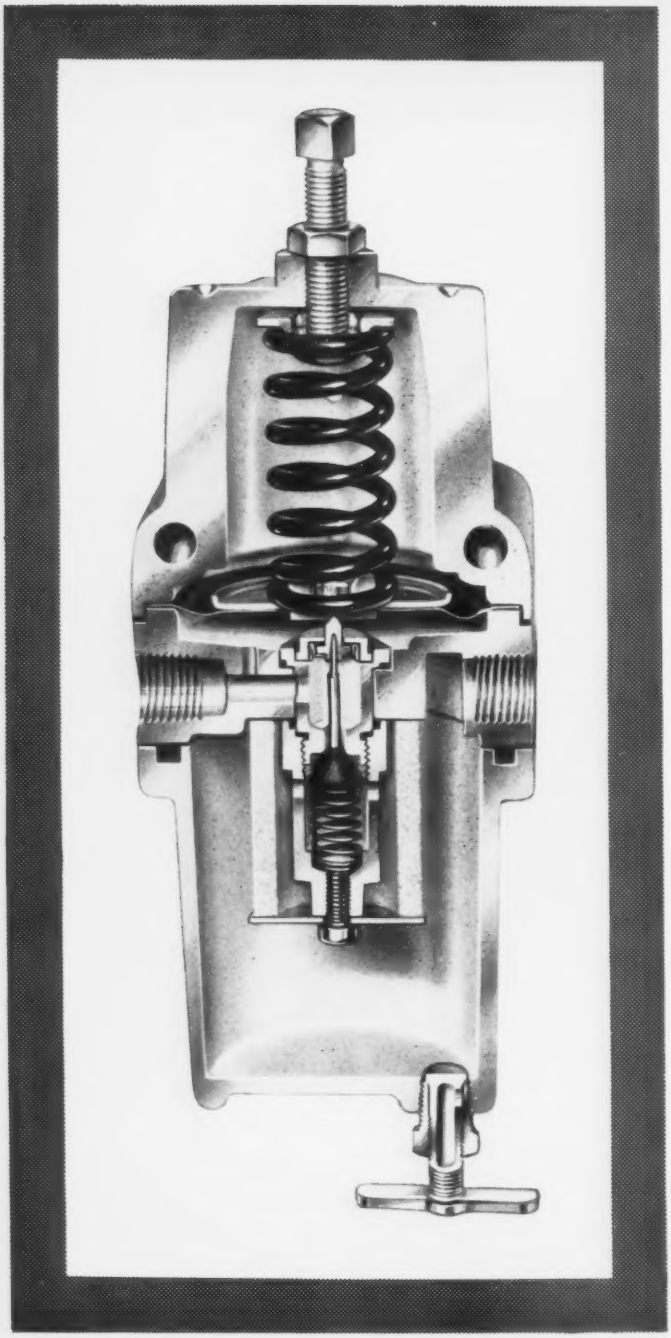

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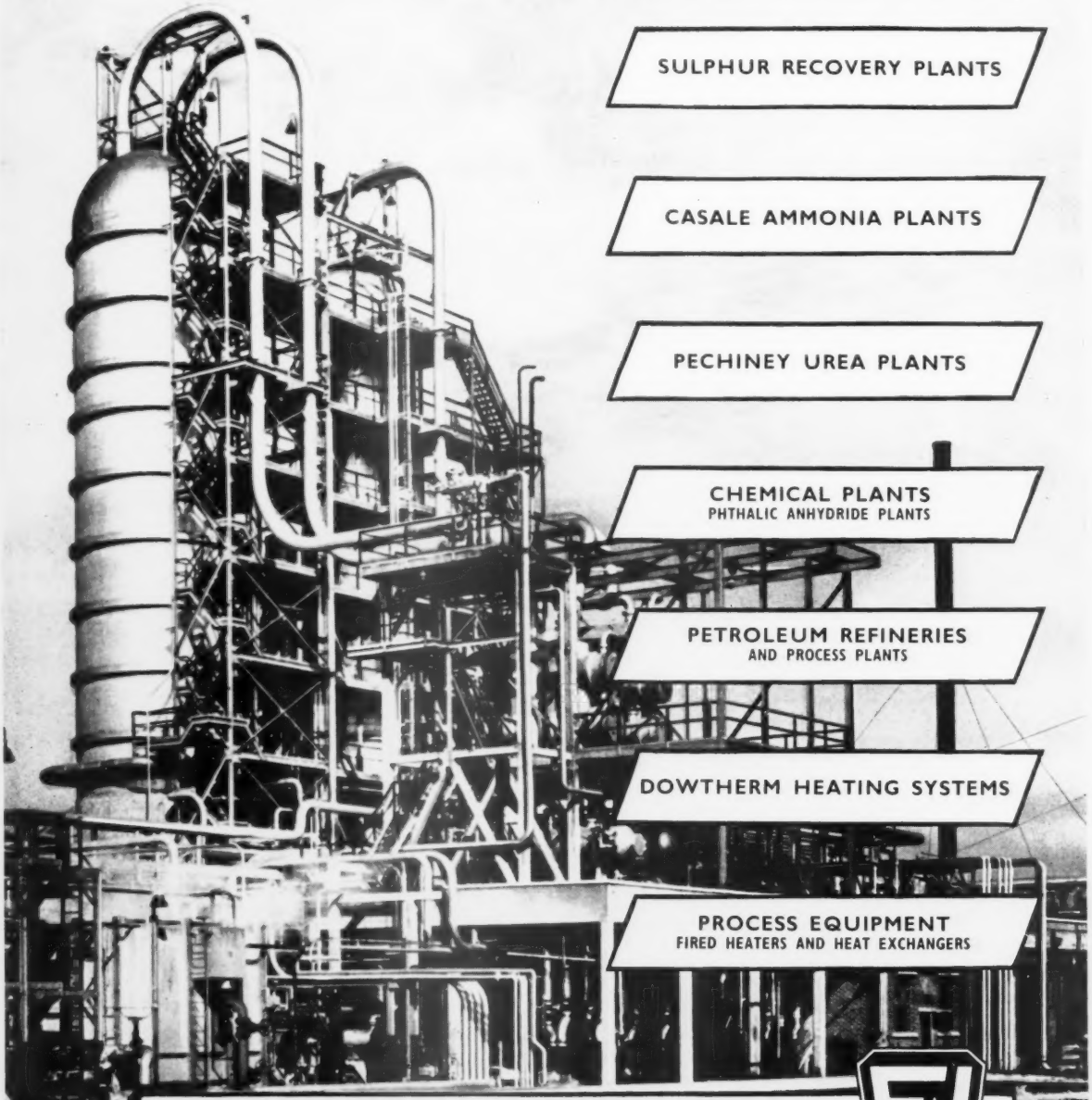

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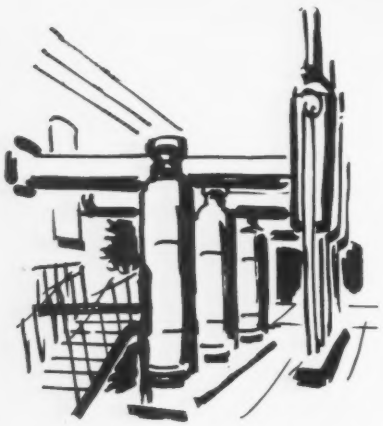

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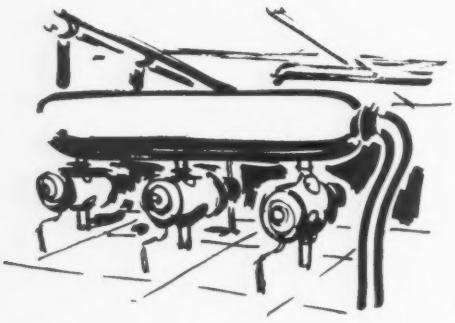

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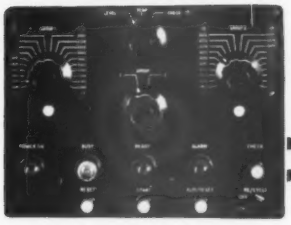

THE WHESSOE/ FIELDEN SERVO TANK GAUGE AT FAWLEY

The Whessoe/Fielden Servo Tank Gauge is now in operation at the Esso Refinery, Fawley. Unaffected by specific gravity changes since it operates above the liquid surface, the sensing head indicates the depth of the liquid to within $\pm \frac{1}{20}''$ accuracy. Linked into a Whessoe S & J Telepulse system which enables Esso engineers in the control room to obtain the level and temperature in a tank by pressing a button, the Whessoe/Fielden Servo Tank Gauge is playing an important part in the operation of this Fawley tank farm. It is being fitted progressively to 81 tanks in all.

The Whessoe Fielden Servo Tank Gauge was developed by Fielden Electronics Ltd. in association with Whessoe who market the gauge. Full details of it and the Telepulse system from:

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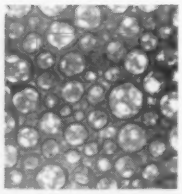

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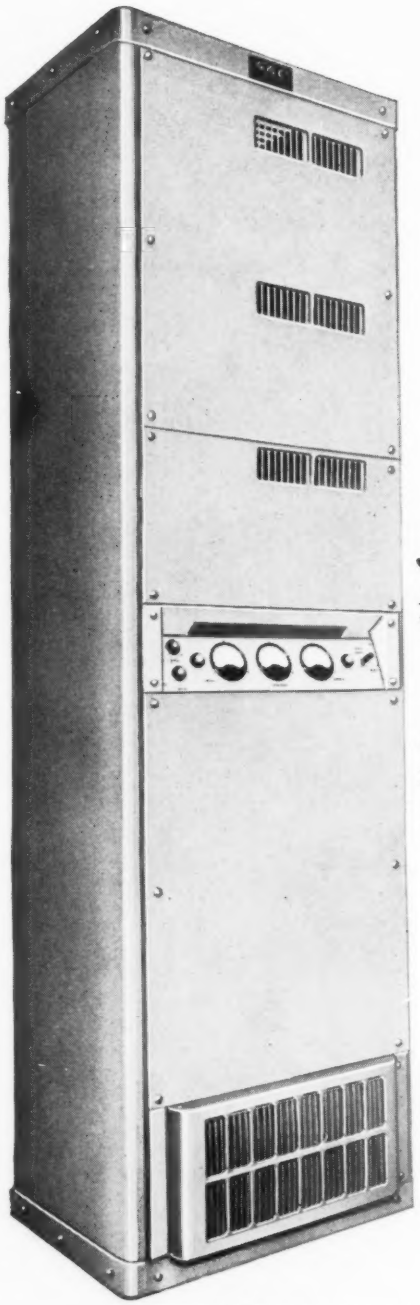

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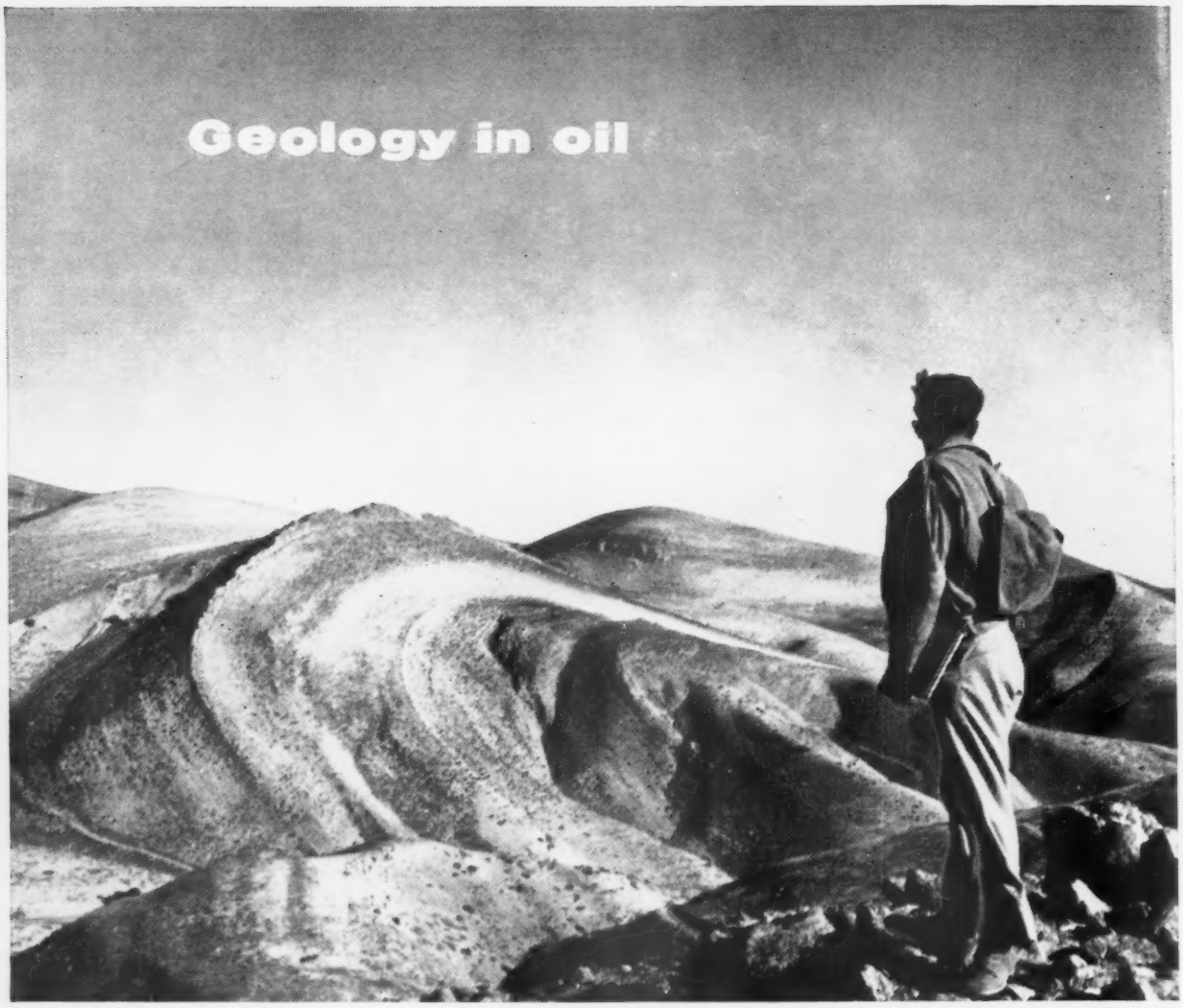
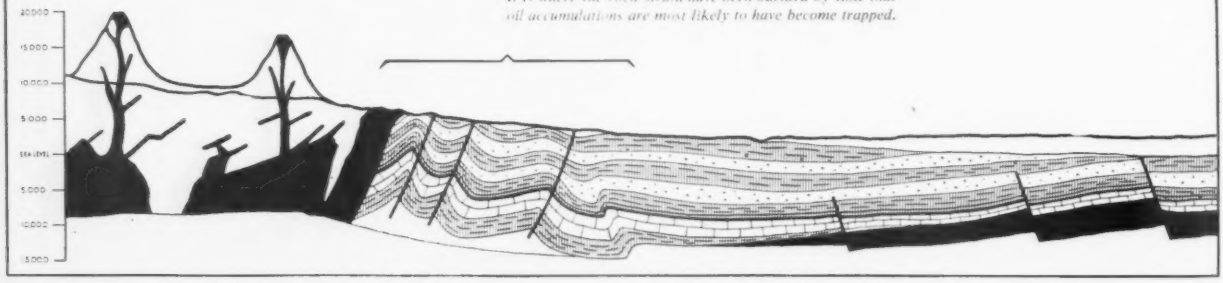


REPRESENTATION OF GEOLOGICAL SECTION ACROSS THE ANDES OIL BASIN

It is where the rock-strata have been buckled by time that oil accumulations are most likely to have become trapped.



The search for oil today requires the organisation of teams of specialists: surveyors, palaeontologists, photogrammetrists, geophysicists, geochemists and sedimentologists.

The object of geological exploration is to define potential oil basins and to locate within them possible oil accumulations.

For 50 years the geologist put his skill at the d sposal of the oil industry; and never in that time did exploration fail to find sources sufficient to keep up with the world's increasing and insistent demands.

But the search for oil today requires more than the hammer and compass methods of an earlier period.

A new exploration venture may call for ten to fifteen years of work and investment before it becomes productive. The need is for precision in every phase, the harnessing of physics, chemistry and mathematics to geology both in the field and in the research laboratory.

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THE INSTITUTE OF PETROLEUM

REVIEW

Volume 13, No. 153 September 1959

Honorary Editor: E. B. EVANS, M.Sc., PH.D., F.R.I.C. *Hon. Associate Editor:* D. L. SAMUEL, B.Sc., A.R.I.C. *Editor:* GEORGE SELL

The Fifth World Petroleum Congress

A Material Contribution to Technical Progress

The World Petroleum Congress which was held in New York during the period 30 May to 5 June was the fifth in the series since the first congress was convened in London by The Institution of Petroleum Technologists (now The Institute of Petroleum) in 1933. As most of our readers will know, the intervening meetings were held in Paris (1938), in The Hague (1951), and in Rome (1955).

It has been announced that the sixth congress will be held in Germany in 1963.

Each succeeding congress has established a new record for attendance and the figures for the latest one show 4410 delegates and 919 ladies in addition. Fifty-three countries were represented.

The Congress was formally opened on the afternoon of 31 May when its President, H. S. M. Burns, took the chair at the inaugural meeting in the Grand Ballroom of the Waldorf-Astoria Hotel. This was attended by over 2500 people. After welcoming, on behalf of the American petroleum industry, all those present he read messages of greeting from President Dwight D. Eisenhower, from the Mayor of the City of New York, and others.

Frank M. Porter, President of the American Petroleum Institute, and E. V. Murphree, chairman of the Permanent Council of the World Petroleum Congress, also expressed their welcome to all delegates and their ladies.

The proceedings then became very informal as refreshments were served and chairs removed to make room for movement. And movement was indeed essential for this was the great occasion when many acquaintances were renewed and old friends got together, in some cases for the first time since the previous congress in Rome.

Scene at the opening ceremony in the Waldorf-Astoria Hotel

The Sessions

Venue of the technical sessions of the Congress, 93 of which were held during the five days, was the Coliseum, on Columbus Circle, and 9 a.m. onwards on Monday saw a steady stream of delegates making their way into the building. This continued morning and afternoon throughout the week. Attendance at the sessions ranged between 70 and 350.

Sir Stephen Gibson, C.B.E., new chairman of the Permanent Council, and D. A. Hough, its general secretary

It is not without interest to note that during the 95 sessions 279 technical papers were presented and discussed in ten main sections. The sections were:

- IA Geology;
- IB Geophysics;
- II Drilling and production;
- III Oil processes and refining;
- IV Chemicals from petroleum and natural gas;
- V Composition, analysis, and testing;
- VI Utilization of petroleum products;
- VII Engineering, equipment, and materials;
- VIII Transportation and distribution;
- IX Operations research, statistics, and education;
- X Symposium on applications of atomic energy to the petroleum industry.

Sections I to IX followed the general lines of previous Congresses, Section X being a special section designed to direct consideration to a number of problems relating to a science comparatively new to the petroleum industry.

In all, 29 countries contributed the papers, which were reasonably well divided between the various sections. For the record and for the information of the statistically minded, Table I sets out details regarding origin and allocation of the papers. This table is based on data extracted from the official programme.

TABLE I. 5TH WORLD PETROLEUM CONGRESS PAPERS

COUNTRY	SECTION											TOTAL
	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	
				NUMBER OF PAPERS								
United States ...	9	2	8	11	12	11	13	8	11	9	12	106
France ...	3	3	2	6	2	3	2	1	2	1	2	27
Great Britain ...	1	1	1	3	1	1	5	6	1	2	2	24
U.S.S.R. ...	2	2	3	2	4	2	1	2	1	—	2	21
Italy	3	2	2	2	2	4	1	—	1	—	—	17
Netherlands ...	1	1	3	2	2	1	1	4	—	1	—	16
Germany ...	2	2	—	4	3	1	4	—	—	—	—	16
Canada	2	1	2	1	1	—	—	—	—	—	—	7
Venezuela ...	1	—	2	—	—	—	1	—	2	—	—	6
Belgium ...	2	—	—	—	1	1	—	—	—	1	—	5
Austria	—	3	1	1	—	—	—	—	—	—	—	5
Japan	—	—	1	—	—	2	—	1	—	—	—	4
Brazil	—	2	1	—	—	—	—	—	—	—	—	3
Argentina ...	—	1	1	—	—	—	—	—	—	—	—	2
India	—	1	—	—	—	—	—	—	—	1	—	2
Iran	2	—	—	—	—	—	—	—	—	—	—	2
Israel	1	—	—	—	1	—	—	—	—	—	—	2
Mexico	—	—	2	—	—	—	—	—	—	—	—	2
Switzerland ...	—	—	—	—	—	1	1	—	—	—	—	2
Chile	—	1	—	—	—	—	—	—	—	—	—	1
Denmark ...	—	—	—	—	—	—	—	—	1	—	—	1
Pakistan... ...	1	—	—	—	—	—	—	—	—	—	—	1
Peru	1	—	—	—	—	—	—	—	—	—	—	1
Poland	—	—	—	—	—	1	—	—	—	—	—	1
Rumania ...	—	—	1	—	—	—	—	—	—	—	—	1
Spain	—	—	—	—	—	1	—	—	—	—	—	1
Sweden ...	—	—	1	—	—	—	—	—	—	—	—	1
Turkey	1	—	—	—	—	—	—	—	—	—	—	1
Yugoslavia ...	—	1	—	—	—	—	—	—	—	—	—	1
TOTAL ...	32	23	31	32	29	29	29	22	19	15	18	279
Number of Sessions	10	8	10	10	10	10	10	8	7	6	6	95

Two very helpful officials. (Right) *Ed Starr, chairman of Public Relations Committee, and Charles B. Towill, press officer*

The registration desks were always besieged by delegates

The Achievement

Sir Stephen Gibson, who has been elected new chairman of the Permanent Council, assessing its achievements said that, to be successful, a congress must be better than its predecessor. It was not enough to maintain a standard, it must be improved upon. From his own observations and from those of others he had consulted, this Congress would contribute materially to technical progress of the industry.

Today the world seems to have rather more oil available than is required and proved reserves of the free world are just about equal to estimated requirements of the next twenty

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Platform party at one of the meetings, showing H. N. F. Schwall (Shell Oil Co.), *vice-chairman of the session, M. E. Hubbard* (British Petroleum Co. Ltd), *chairman, F. A. Gitzendanner* (Standard Oil Co. (Indiana)), *technical secretary, and Mr Pojidaeff, interpreter*

An attentive audience, including (left to right) *R. Vichnievsky* (Institut Français du Pétrole), *Professor F. H. Garner* (University of Birmingham), *and Professor M. R. Fenske* (Pennsylvania State University)

years. If they were less, said Sir Stephen, some would be feeling slightly uncomfortable and all thoughts would be concentrated on meeting forward needs with little time for technical progress.

Technical progress is not smoothly continuous, but seems to come in steps generally after a period of easy running in the technical side of the industry. Such appeared to be the situation today, and from a number of papers and discussions at this Congress it seemed that the next few years would probably be a period of above the average progress.

Even if this did not happen, the Congress would have been justified for providing a survey of existing knowledge impossible to obtain in any other way. That was the basic reason for the Congress and if the high standard set by past congresses was not maintained and improved upon, the Congress would die.

Concluding, Sir Stephen said that, with the achievements of this Congress behind them, they looked forward to an even more successful one in four years' time.

Atomic Energy and Oil

Any attempt to summarize adequately nearly three hundred technical papers is a task not possible to complete in the time and space available, particularly as within a comparatively short time the full texts and reports of discussions will be obtainable in final volume form. It is felt, however, that some reference should be made to Section X and some present-day thinking on atomic energy and the petroleum industry. Incidentally, the first Session of Section X, when Dr Robert E. Wilson and Dr Edward Teller delivered papers, attracted the biggest attendance at any session of the Congress. Nearly 600 persons were present.

Speaking at a press conference on the opening day, E. V. Murphree, chairman of the Permanent Council of the Congress and president of Esso Research and Engineering Co., said that another technical breakthrough would be necessary before atomic energy could become an important source of energy. The prospect of using atomic explosives for peaceful uses was "a recent development and certainly a very exciting one". For large earth-moving jobs they could cost far less than conventional explosives and could be compacted and placed down drilled holes to considerable depths.

Another peaceful use of atomic explosives might be in the recovery of oil from shale-oil and tar-sand. An atomic explosion underground would create a cavity into which sand or

Early morning parade as delegates stream into the Coliseum for meetings

Around the IP Stand

Visitors at the IP stand, which was in the charge of Mrs J. Cummings and who is seen in (3) *with the President, C. M. Vignoles, and in* (1) *with the general secretary, were many. Thus, we saw D. L. Samuel* (2), *our honorary associate editor, D. C. Ion* (4) *of Triad Oil Co. Ltd, Fred Trim* (5) *of Universal Oil Products Co, a trio from C. C. Wakefield & Co. Ltd, T. S. Elliott, G. H. Thornley, and Norman Hitchcock* (6), *Dr W. J. Hickinbottom of Queen Mary College* (7), *W. S. Ault (Shell-Mex and B.P. Ltd) and "Jock" Davidson (Canadian Shell Ltd)* (8), *Dr G. D. Hobson (Royal School of Mines), D. J. Mockford (Asiatic Petroleum Co. Ltd), and A. J. Haworth (American Overseas Petroleum Co.)* (9), *and Gordon Duncan* (10), *the very much over-worked assistant general secretary of the Congress, and Mrs Duncan*

T. C. Bailey (Institute of Fuel and Shell-Mex and B.P. Ltd), *Dr W. E. J. Broom* (Esso Petroleum Co. Ltd), and *C. A. Harrison* (Iranian Oil Services Ltd)

shale chunks would fall, the oil then being recovered by heating.

Discussing the general question of the probable impact of atomic energy on the world petroleum industry in one of the papers in Section X, Dr Robert E. Wilson, retired chairman of the board of Standard Oil Company (Indiana) and a member of the General Advisory Committee of the U.S. Atomic Energy Commission, suggested that atomic energy should not be regarded as a competitor to oil but "as something which will come along in the nick of time" to help the world meet the demand for power. There would be few, if any, unsubsidized atomic power plants completed in the U.S. for commercial purposes before 1968, he said, and it would not be before 1968-1980 that some of the larger power plants would be built without subsidy to utilize atomic fuels.

Dr Wilson declared that atomic energy would have "very little effect on the development of the domestic oil industry in the next 25 years". There was very little chance of it being used to replace gasoline in automobiles, or to replace oil fuel in homes.

Dr Edward Teller, Professor of Nuclear Physics at the

An old friend of the IP R. A. (Shorty) Cattell of the U.S. Bureau of Mines

C. E. Evans (British Hydrocarbon Chemicals Ltd) *makes for the plane at Gander*

University of California, dealing with the peaceful uses of atomic explosives, said "It is much easier to release energy uncontrolled than to be able to control it". To be economical, he said, nuclear explosions must be large and this posed many safety considerations. The main problems in developing peaceful uses were to find bombs small enough to be useful and in controlling fall out. Referring to the use of underground explosion in tar-sands and in oil-shale, he considered that much research was needed before accurate predictions of results could be made.

The other papers in Section X dealt with technical aspects of such matters as the use of isotopes in the petroleum industry and the effect of radiation on hydrocarbons. Thus, B. A. Fries, D. E. Hull, and R. J. Dupzyk (*California Research Corpn*) described a method whereby radioisotopic compounds could be used to measure fractionation in all kinds of refining processes, while M. J. Furey and J. F. Kunc (*Esso Research & Engineering Co.*) dealt with the use of radioisotopes in fuel and lubricant research. A. De Haan (*Tracerlab Inc*) stressed the importance of short-lived isotopes to counteract the fear of possible health hazards. He pointed out that for pile-produced isotopes, the short-lived varieties were most economical in terms of radiation delivered. He concluded with suggestions as to their supply and application.

In the field of radiation chemistry, M. J. Grosmangin (*Cie Français de Raffinage*) reported work carried out under Professor Mogat at the University of Paris on the irradiation of aliphatic hydrocarbons in the presence of radical scavengers. The effect of radiation on various hydrocarbons was the subject of papers by P. J. Lucchesi, D. L. Baeder, and

The U.S. Bureau of Mines exhibit, with Janet Coffelt in charge

J. P. Longwell (*Esso Research & Engineering Co.*), by F. W. Lampe (*Humble Oil & Refining Co.*), and by M. F. Hoare, T. A. Garbett, and R. E. Pegg (*Esso Research Ltd*), the latter discussing the effect of gamma radiation on the thermal decomposition of *normal* and *iso*-pentanes.

On the practical side J. J. Frewing (*The Shell International Petroleum Co. Ltd*) and N. A. Scarlett ("*Shell*" *Research Ltd*) surveyed the mechanisms which give rise to special lubrication problems in nuclear power stations and reported the effect of atomic radiation on a variety of lubricants. A range of petroleum lubricants was exposed to reactor radiation, gamma radiation, and fast electrons. It was found that hydrocarbon oils increase in viscosity, the extent depending on their composition. Paraffinic oils are least stable and eventually solidify, but naturally occurring aromatic compounds when present have a beneficial effect. Several synthetic lubricants examined were more unstable to radiation than the paraffinic hydrocarbons.

Studying the effect of radiation on the stability of synthetic lubricants, C. L. Mahoney, E. R. Barnum, W. W. Kerlin, K. J. Sax, and W. S. Saari (*Shell Development Company*), consider that polyphenol ether derivatives show real promise for use at high temperatures in the presence of radiation. They are also thermally stable and have good physical properties and lubrication characteristics.

Spotlight was thrown on the use of isotopes in the production side of the industry by G. N. Flerov, F. A. Alexeyev, V. N. Dakhnov, Yu A. Gulin, and Y. S. Shimelevitch (*U.S.S.R. Academy of Sciences*). They disclosed that nuclear physics were being used widely in Russia in exploration for oil and gas, in the determination of water-oil and gas-liquid contacts in determining the technical conditions of wells, and in defining movement of water. Research was being made on the use of artificial radioactivity for rock analysis, and also into the nature of radiometric aromatics above oil and gas deposits.

A. H. Youmans and C. W. Zimmerman (*Well Surveys Inc*) also describe nuclear log techniques in which fast nuclear bombardment of oxygen underground produces artificial radioactivity which indicates the presence of oil. Nuclear well logging is considered by W. E. Mott (*Gulf Research & Development Co.*) and N. M. Ediger (*British American Oil Co.*) to be one of the most important peaceful applications of nuclear physics. However, developments have been slow and many promising methods have yet to be tried experimentally in a borehole.

SYMPOSIA

In addition to the meetings in the ten main sections, four special symposia were held, on lubricating oil classification, on sedimentology, on petroleum source rocks, and on geochemistry. Brief reports of these follow and for the last two we are indebted to Dr G. D. Hobson.

Lubricating Oil Classification

Under the chairmanship of Professor Henri Weiss, two papers were presented as a basis for discussion in relation to a resolution passed at the Fourth World Petroleum Congress that a study should be made of need for a more appropriate method of expressing viscosity-temperature relationships.

J. C. Geniesse (*Atlantic Refining Co.*) reported that a study made by a committee had shown that revision of the index could be made in two ways. First, the scale should be

Seen in the Lounge

(Top) *C. S. Windebank and A. Osborn* (Esso Research Ltd) *and* (right) *D. C. Sandy* (Standard Oil Co. (New Jersey)) *with Dr W. E. J. Broom* (Esso Petroleum Co. Ltd)

(Below) *Howard R. Tate* (exhibition organizer) *and Gordon W. Duncan* (assistant general secretary, (centre) *B. N. Darbyshire* (University of Texas), *and* (right) *Brian Orchard Lisle* ("International Oilman") *and a one-time active member of the IP London Students Section*

modified so that it would be a more accurate tool for rating lubricating oils of to-day, many of which are synthetic or have added polymers and react differently to temperature changes than do pure mineral oils. For use by scientists engaged in research and development work, the committee was preparing a revision of the scale above 100 VI for discussion. The next step would be the preparation of a more fundamental scale.

R. N. J. Saal, reporting the work of the International Committee on Rheology, presented a critical review of the various proposals for classifying lubricating oils according to their viscosity-temperature relationships. The conclusion reached was that there is an urgent need to concentrate on choosing new principles for classification rather than to discuss the details of any one system.

The Permanent Council of the World Petroleum Congress in Session

Sedimentology

At the Fourth Congress it was resolved that the progress of sedimentology should be reviewed and the International Association of Sedimentology was charged with the task. The result was the presentation of a bibliographical review by A. Vatan (*Institut Français du Pétrole*), and several other papers, at a special symposium.

The principal paper in the morning, "Recent Sediment Studies by Americans," was by Professor Francis P. Shepard (*University of California*), and president of the Association.

Professor Shepard, who was director of the American Petroleum Institute's "Project 51" which conducted a seven-year field study along the Gulf Coast, disclosed that the project had been completed. Findings show that the Mississippi delta has three facies consisting of silty sands and clays, he said.

At the afternoon session, the symposium heard a paper, "Recent Trends in American Sedimentology", read by one of its authors, Dr Raymond Siever (*Harvard University*).

Dr Siever said that "in the past few years, a greater interest in sedimentary geochemistry has become evident". Work is "particularly advanced" on carbonate minerals and rocks, he said.

In his summary remarks, Monsieur Vatan stressed the importance of analytical observation in the study of sedimentology. "Minerals have a range of stability, which, as a rule, may be determined a *priori* by experimental methods, but there are so many variables that the problem is very complicated and in most cases we are still in the early stages," he said.

He urged that documentary work be placed under the care of an international group, such as the World Petroleum Congress. Noting that the association of sedimentologists began as a European body, he declared that "a larger collaboration would be useful between world geologists".

Another job that could be taken over by the Congress, or a similar international body, would be nomenclature standardization, Monsieur Vatan stated.

Chemical Approaches to the Recognition of Petroleum Source Beds

The origin of petroleum and the nature of source rocks have exercised the minds of oil geologists and others for many years. Observations have been made, deductions drawn from associations and experiments of various types carried out over a long period, but some of the most helpful studies have been made only during the past few years. Various factors have contributed towards the greater effectiveness of the more recent investigations, notably new techniques and equipment, and vigorous efforts by major oil companies and others. Much remains to be done, but the organization of a symposium on "Chemical approaches to the recognition of Petroleum Source Beds" was a most worthwhile part of the activities of the Congress.

The symposium was organized by a committee under the chairmanship of Dr M. Louis (*Institut Français du Pétrole*) and Dr W. E. Hanson (*Mellon Institute*) set up as a result of a resolution passed at the Third Congress.

The greater part of a day was given over to the presentation of a series of papers. These included such subjects as "Kerogen" (P. H. Abelson), "Study of organic matter contained in sedimentary rocks" (Y. Khalifeh and M. Louis), "Investigation of the organic substance contained in the Posidonia shale of Northwest Germany" (H. R. von Gaertner and H. Kroepelin), "Significance of hydrocarbons in sediments and petroleum" (W. G. Meinschein), "Distribution of *n*-paraffins as a clue to the recognition of source beds" (E. E. Bray and E. D. Evans), "Distribution of petroleum and related organic matter, in sedimentary rocks" (J. M. Hunt), "Some chemical aspects of petroleum genesis as related to the problem of source bed recognition" (J. G. Erdman).

An audience of about fifty followed the talks with great interest, and many of the listeners engaged in the discussion which followed. Formal discussion had to be stopped, not for lack of speakers, but because a certain amount of official business had to be transacted before the end of the period allotted to the meeting.

A wealth of material was presented. The main parts of some of it had appeared in print, and it is to be hoped the rest of it will become available more widely, either by publication directly associated with the Congress or in some other form.

Petroleum Geochemistry

A general Petroleum Geochemistry Symposium was held at Fordham University, New York, on 4 June.

Twelve articles on the fundamentals of organic geochemistry, five on the origin of petroleum, and four on geochemical methods of petroleum exploration had been issued as pre-prints, and a prior vote based on the titles had

led to the selection of four which were to be presented verbally in a matter of ten minutes each by the authors.

The symposium was preceded by a dinner to which the authors and a number of distinguished discussors had been invited. The president of Fordham University, the Rev. Laurence J. McGinley, S.J., opened the proceedings at 8 p.m. Professor B. Nagy spoke briefly, and Dr G. D. Hobson performed the duties of discussion moderator. Despite the counter-attractions of a symphony concert at Carnegie Hall, a reception by Esso Research and Engineering Company, the other activities of New York, and the distance of Fordham University from the centre of the city, about 150 people were present.

W. C. Gussow spoke on "Knowledge on the origin of oil", E. G. Baker on "The accumulation of sediment hydrocarbon to form crude oil", S. L. Miller on "Synthesis of organic compounds in the atmosphere of the primitive earth", and Professor P. A. Witherspoon on "Geochemical prospecting for petroleum in the Soviet Union", Lively discussion, broken only partly by a short break for coffee, filled the rest of the evening and was suspended at 11.45 p.m. only by the need to catch the last train for New York at 12.09 a.m. Many people took part in the discussion, which dealt not only with the papers mentioned above, but also with the others printed, and they included L. G. Weeks, Professor P. F. Kerr, Professor S. J. Pirson, Rev. J. J. Lynch, Dr P. E. Kent, Dr J. M. Hunt, S. R. Silverman, D. B. Sikka, G. A. Hill, F. J. Stevenson, Professor A. A. Gillet, G. V. Chillingar, and Dr I. A. Breger. A small group adjourned to a nearby coffee shop for further discussion until 1.30 a.m.

On the following morning small clusters of those who had attended the symposium were to be seen in the corridors of the Coliseum, continuing the discussion, for many points remained to be argued and are likely to occupy the thoughts of various participants for a long time ahead.

GENERAL LECTURES

As on previous occasions, a series of evening general lectures were given during the Congress. These were delivered in the Carnegie Hall.

Oil's Contribution, Past and Present

The lecture was given by L. F. McCollum, president of Continental Oil Company, who said that oilmen throughout the world should seek the vision to recognize, define, and accept a "community of interest in oil" in a common effort to make the world's oil resources available on equitable terms to all people and for the benefit of all mankind. He stated that he did not mean that we should abandon our "individual objectives", and explained: "By a community of interest in oil, I simply mean recognition and acceptance of certain fundamental principles which will enable us to pursue our individual interests on an enlightened basis and which will aid us in the ultimate accomplishment of our individual purposes."

"Our best hope for achieving our individual purposes lies in recognition of our mutual interdependence in oil matters," he said, "and in acceptance of a community of interest in oil, to which our individual short-run interests may at times be subordinated in order that our long-term goals may be achieved."

Mr McCollum said some of the present world oil problems were the result of the geographical separation of supply and consuming areas, the present abundance of crude oil supplies, competing economic interests of oil participants, and conflicting interests among nations.

He suggested five "cornerstones" or factors upon which oilmen might build a sounder community of interest and which "might serve to guide our actions in the oil world"—technological, economic, social and moral, political factors, and mutual interdependence.

"We should continue to encourage the free interchange of technological and managerial skills," he added. "By drawing upon this available backlog of know-how, countries in the early stages of oil development can reduce the time lags normally involved in the establishment of full-scale oil operations."

"A substantial portion of the revenues from oil operations should flow into research programmes designed to encourage sound conservation practices and to promote the use of petroleum products," Mr McCollum stated. "The future undoubtedly holds many important new applications of oil and its derivatives, if we have the diligence and intelligence to find them."

"All countries which are fortunate enough to have potential oil deposits should encourage the discovery and development of those resources," he stated. "In a world where malnutrition, illiteracy, and disease still exist, we cannot afford to follow policies and practices which would have the effect of locking up one of our richest sources of energy."

"Oil resources should be developed and utilized in such a manner that they may contribute to diversified industrial development in world producing areas."

He reported that enlightened business management throughout the world to-day is "fast coming to recognize the fact that there are some guide lines for the conduct of business affairs which transcend technological and economic considerations—to considerations of what is morally right and what is morally wrong."

"All parties to voluntary agreements should faithfully observe the terms of their contracts," he added. "Sound and profitable commercial relationships can be built only upon a foundation of commercial integrity."

Mr McCollum said world oil business should be conducted with a minimum of political interference and each nation should "seek to employ the economic or business system that will be most suitable for the development of its oil resources."

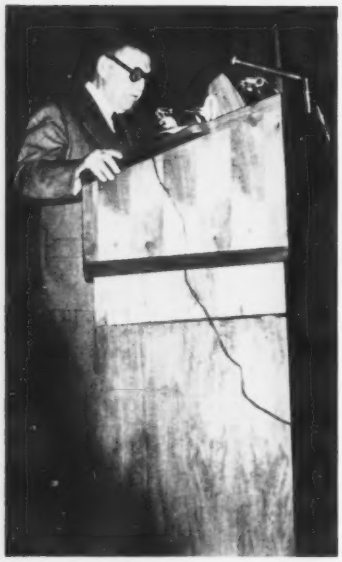
Standardization, Oil, and Noblesse Oblige

Choosing this as the title of his lecture, Colonel S. J. M. Auld, a past-president of the Institute of Petroleum, called upon the oil industry to support the International Standards Organization (ISO) and its Technical Committee 28 (TC 28).

Defining a standard as "a rule or criterion whereby the quality of goods can be gauged," he said that standardization had two chief ends—first the simplification of work and secondly the improvement of minimal qualities of goods.

"Standardization," he said, "is not a one-sided affair; it is a code of understanding and behaviour entered into jointly by manufacturer and consumer for the express purpose of raising the general standard of the goods concerned and thereby the general standard of living." The keynote of national standardization effort was seeking the *willingness* to collaborate and the *will* to share.

There are associations for standardization in some 40 countries, mostly producing countries.



Colonel S. J. M. Auld delivering his special lecture

The ISO, said Colonel Auld, is the successor to the earlier ISA and is a federation of many national bodies with 93 committees. The secretariat of TC 28, concerned with petroleum, is held by the U.S.A., and through its secretary (W. T. Gunn) is firmly linked with the American Standards Association, the American Petroleum Institute, and the American Society for Testing Materials.

What then is the world oil industry doing about world standardization, asked Colonel Auld. The U.S.A., through Committee D-2 of the ASTM, and Britain, through the Standardization Committee of the IP, had established bilateral understanding and between them had 28 identical and 50 technically interchangeable methods of oil testing.

All this was a fine start, he said, but unfortunately seemed to have slowed down. In international get-together national pride is probably the greatest obstacle to be overcome and if difficulties arise between countries speaking the same language, how are we to get on with a score or more leading oil countries involved.

The answer is clear, said the Colonel. We must have a leader in a position to show the way—the country holding TC 28 secretariat, the U.S.A. Moreover, the United States is still the greatest individual producer, refiner, and user of petroleum.

In the U.S.A., where standardization is more extensive than elsewhere, oil and allied interests continue to be foremost. The U.S.A. was already a substantial importer of oil and had great and increasing foreign oil interests. Through the ASTM and its relations abroad it already led in the development of testing methods.

Continuing, Colonel Auld said: "I feel you will agree that it would not be only *noblesse oblige* for America to put its back into THE leadership of world petroleum standardization but mere common sense."

Concluding, he said that 1959 has the makings of a great year in international standardization. It started by the "inch-pound" countries agreeing a standard yard and pound. Oilmen may even look forward to a common gallon.

Oil in Africa

Seven years after the search for oil started, the Sahara was among the first ten oil-bearing areas of the world, said **R. L.** Buttin, director of the Société des Pétroles d'Afrique Equatoriale Française, in his lecture.

He said that next to the Middle East, Africa was the area where exploration presently is most effective.

"The search for oil in Africa," he said, "has made a good start. Work is being carried on almost everywhere, starting with the coastal regions for obvious economic reasons but now, thanks to results obtained in the Sahara, prospectors will not hesitate to move into the very heart of the continent."

Mr Buttin went on to discuss the Sahara in detail because, he said, "the proved reserves of the Sahara . . . are six times larger than the reserves of the remaining African Territory."

He then traced the history of the development of the four productive areas: Ahnet, Edjeleh, Hassi Messaoud, and Hassi R'Mel. The last, he said, was one of the largest in the world and could increase substantially the reserves of both Algeria and Europe. Presently several projects for transportation from this field were under study.

"It will be a long time," he said, "before the Sahara is really comparable to the Middle East, and present efforts will have to be continued before any such comparison can be made."

"But," he added, "I do not intend to hide the costs of exploration in the Sahara. Transportation charges represent a large part of cost—at least 20 per cent. However, every day brings proof that forecasts of the discoveries thus far made were pessimistic.

"I should like to have you share my firm belief," he declared, "that Africa, over the past three years, has become potentially one of the world's leading oil countries."

"I strongly believe," he said, "in the necessity of improving living conditions in underdeveloped countries. I am convinced the petroleum industry can, without ever surrendering the principles of sound management, contribute to humanity in Africa, and consequently to the prosperity of the world."

He said the petroleum industry could take an active part in the fulfilment of improving living conditions in the new countries throughout the world by training local technicians and forming an elite; by creating suitable jobs; by promoting local employees as they become increasingly qualified; and also by contributing to establishment of secondary industries which provide employment for a large number of workers.

"The petroleum industry," he said, "has an important part to play in improving the general standards of living. Some might say that it is the penalty of its importance; I would more readily say it ought to be the pride of its power.

"Oil has already largely contributed to the prosperity of new countries . . . As far as the African countries are concerned . . . it seems to me that this . . . contribution could be improved."

THE BANQUET

The official banquet in the Grand Ballroom of the Waldorf-Astoria Hotel was attended by over 1700 delegates and their ladies and was a very colourful affair. It was presided over by **H. S. M. Burns,** president of the Congress, who opened the after-dinner proceedings in his typical light-hearted manner.

The top table at the Banquet made a brilliant spectacle

Utilization Prospects

First formal speech was by **E. V. Murphree,** chairman of the Permanent Council, who said that the world was now living in an excess of crude oil and that the oil industry should expand present uses and find new uses for oil products to increase volume demand. This could be done through scientific progress—the subject of the Congress.

Citing examples of future possibilities, he mentioned: acceleration of the use of heating oil in Europe through development of low-cost efficient home-heating devices; improvement in asphaltic materials to help expand highway building and in turn increase demand for automobile fuels; new oil products for land fertilization and for fighting plant disease and insects.

The industry's future thus depended to a large degree on scientific and technical advances which, in turn, depended on people, he said. To maintain the flow of trained personnel, the industry needed two very important things—an overall improvement in education, and the means of keeping its scientists and engineers up-to-date in their fields.

Following Mr Murphree, the four vice-chairmen of the Permanent Council delivered addresses.

Future Production Methods

Sir Stephen Gibson, C.B.E., giving his impressions of the situation in the producing side of the industry in twenty years time, said that in 1979 world oil demand would be about 70 million barrels per day, or 3500 million metric tons per annum. To-day it was around 25 million barrels per day.

There were no indications of development of direct methods of finding oil within the 20 years, he said, and no new geophysical methods were in sight. The present methods were being steadily improved and were contributing more and more to knowledge of underground structures. Stratigraphic data was becoming increasingly effective as an aid to oil finding.

Drilling, said Sir Stephen, was on the threshold of radical changes and there was little doubt that within twenty years the power would be applied directly to the bottom of the hole. Other changes would then follow and he visualized flexible drill pipe wound on a drum or pipe with flexible joints which could be pulled out of the hole and laid and folded horizontally on the ground without breaking joints. Drilling with diamonds or other durable materials would be increasingly used, he said, and automatic control would be employed to a greater extent.

Improved methods and materials would permit drilling to 30,000 feet and deeper and at that depth the hydrocarbons were likely to be gaseous. A simple process would be needed to transform them to a stable liquid for transportation.

The next step in offshore drilling would be to drill from floating vessels, and in remote land areas the aeroplane or helicopter would be used for transport of equipment.

In conclusion, Sir Stephen said that it was his impression that the huge amount of oil required in the next twenty years would be found and produced. If not or if it became too expensive, shale-oil, of which great quantities were available, would come to the rescue.

Energy Requirements

Professor Carlo Padovani, said that it had taken thousands of centuries to go from the first fire of primitive man to modern industry and domestic uses of fuel. To reach the small beginning of theoretical and technical developments in thermal engines and their fuels at the turn of the century had taken thousands of years, but development over the last fifty years had been breathtaking in its magnitude.

In the last thirty or forty years, he said, improvements and achievements in fuel use were substantially marked by the use of petroleum and natural gas to replace solid fuels. Now the advent of atomic energy seems to threaten the future of the oil industry. Are we to believe, he asked, that in twenty years the supremacy of oil will be over?

Professor Padovani said he was convinced that progress in the use of atomic energy for producing electricity and for special achievements would be more rapid than generally expected.

Energy requirements over the next twenty years would be anything up to half of the total used since the beginning of time. Petroleum would still have the lion's share in meeting increased demands and in twenty years would provide at least twice as much as at present.

E. V. Murphree, chairman of the Congress, speaking at the Banquet, with H. S. M. Burns, the president, looking on

Atomic energy and conventional fuels would be co-operative rather than competitive and the use of the former for producing electrical power would make larger amounts of oil available for chemical production.

In 1979, concluded Professor Padovani, the Tenth Congress would discuss many new problems not with us to-day.

Research Developments

Rene Navarre said that the first aim of the future should be to see that the service which oil was already giving to a small fraction of mankind was spread more widely. No other natural resource could claim to be such an efficient instrument of unlimited increase of wealth, yet it still had to make its start in many places.

The first task of new research centres should be, he said, to provide more economic exploration techniques and more efficient methods of production. In short, it should be made easier for all to initiate economic development through access to oil production and supply.

In order that new production should lead to prosperity it was still necessary that they should be worked up in industrial centres and with due regard to local conditions. Research workers in these centres would probably draw their solutions mainly from the results of scientific work in the laboratories of those nations already far ahead in economic development. The more fundamental those results the more the underdeveloped countries could expect from them.

It was dangerous to be a prophet, said M. Navarre, but he would state that "the man who has to find clothes, lodgings, and food, will in the future receive more and more contributions from petroleum science and oil production. I believe that the large quantities of crude oil available and the better control of the reactions will result in the production of inexpensive new construction materials that will be better adapted to their working conditions and easier to use than the conventional ones."

He was convinced, he said, that the control of direct selective oxidation would open new prospects in the manufacture of basic chemical products; that petroleum would continue to be of great importance in energy production, possibly by the direct transformation of its chemical energy into electric power; and that petroleum would bring deep changes in metallurgy either by direct reduction of the ore in solid form or by selective precipitation of metals from their oxide solutions.

Concluding, he said that while the production laboratories would concentrate their efforts towards a greater knowledge of nature, the refiners and chemists would increase their efforts to continue the work of nature.

The European Market

J. A. Beukers dealt with the European market for petroleum products. Since 1946 Europe's use of oil had increased fivefold to about 3½ million barrels per day. Without the contribution of oil to Europe's growing energy needs, her economy could not have expanded as rapidly as it had.

There had been a large expansion in the European refining industry which to-day provided about 85 per cent of the demand. A new significant development was the construction of pipelines to carry crude oil from seaboard to the interior. These would permit refineries being close to markets and result in savings in transport of products.

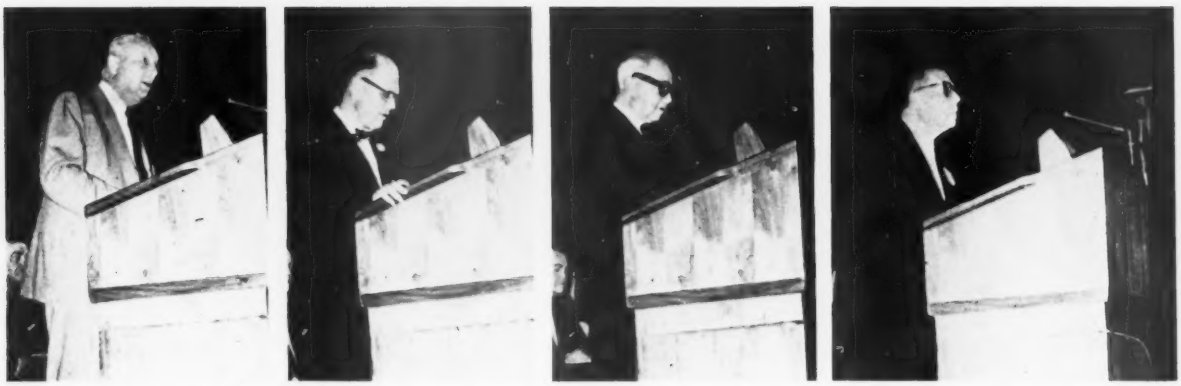
A lot had been said about the industry's spare capacity in production, marine transport, and refining. He did not believe that to be as serious as it appeared when it was considered in terms of demand and emergency.

For the future the European market offered great possibilities of further growth. Its annual per capita consumption was only a little more than three barrels compared with 19 in the United States. Its automobile ownership ratio of one car for every twenty persons was very modest, but an accelerated road-building programme, increased industrialization, and a trend to higher living standards, all suggested a strong growing market for gasoline.

Higher living standards meant expansion of the home-heating oil market, the preference for diesels for railroad and marine use indicated a growing demand for diesel oil, and industrial growth and the use of oil for electricity generation forecast a vigorous market for heavy fuel oil.

It was estimated, he said, that in 1980 nuclear power would supply about 12 per cent of Europe's total energy requirement, and that oil's share would increase from the present about one-fourth to nearly two-fifths. This confirmed his view that the oil industry in Europe could look forward to a healthy future.

Sir Stephen Gibson addressing the Congress members at the Banquet



Speakers at the closing session included H. S. M. Burns, E. V. Murphree, Sir Stephen Gibson, and Dr Ing. h.c. Guenther Schlicht, a vice-president of the Congress and a newly-elected vice-chairman of the Permanent Council

THE CLOSING SESSION

Under the chairmanship of H. S. M. Burns, president of the Congress, the closing session was held in the Carnegie Hall and was comparatively short in duration.

E. V. Murphree, said that the papers presented in all sections were a lasting record of technical progress. There had been good discussions at the meetings themselves and also more informal and equally fruitful discussions on many other occasions.

He paid a tribute to the men of the oil industry who had done so much to ensure the success of the Congress. He also thanked the companies and organizations who had provided material assistance by way of finance and the provision of staff.

Thanks were also due to the technical and to the general press, to the members of the various committees, and to all members of the Congress. Special thanks were due, said Mr Murphree, to the staff of the Congress and he wished to pay special tribute to Gene Davis and Gordon Duncan, general secretary and assistant general secretary respectively; to Ed Starr and Charles Towill, for their work in the press and public relations field; to Howard Tate, for work in connexion with meeting facilities and the exhibition; to James Muckell for meeting services and registration; to Miss Fan Cox, for looking after entertainment, travel, and hotels; to Frank Cutting for his editorial work; and through them to all their staff who had contributed to the running of the event.

THE EXHIBITION

Associated with the Congress was an exhibition of petroleum equipment which occupied two floors of the Coliseum. In all there was a total of over 240 stands, these covering the products of some 260 U.S. and 90 other companies serving the industry. Several stands were devoted to groups of affiliated companies. That such a number of exhibitors took advantage of the opportunity to show their wares so soon after the renowned International Petroleum Exposition at Tulsa, which had ended only a week before, must be taken as a tribute to the pulling power of the World Petroleum Congress in gathering together a wide circle of oilmen to whom such an exhibition would be of value and interest.

In the time available and in the absence of a complete descriptive catalogue of the exhibits it was not possible to collect detailed information of each and every exhibit. Those who found time to visit the exhibition, and they were many, for no stand ever seemed to be without visitors, there was much to interest and much to be learned on every phase of the industry. Coverage was complete from pieces of equipment used in exploration and drilling for oil, to examples of the uses to which petroleum products are put. Although the Coliseum did not offer the same spaciousness as Tulsa for the inclusion of drilling derricks and such large pieces of equipment, it did bring them to the notice of the visitors by means of photographs and models. In fact some of the refinery models were worthy of examination as examples of the skill of the model maker. One particularly striking model would perhaps best be described as a "micro-model" so small was the scale—and we were assured that it was to scale.

Between the two extremes of the industry—exploration and utilization—the outstanding impression was the trend towards the use of automatic and electronic equipment, and of computers in the industry. An interesting example was the use by one process design company of a digital computer in

A computer solving problems for visitors on the Kellogg stand in the exhibition and (inset) *the ethylene plant section on which piping was designed during the exhibition*

the design of new process units, the re-vamping of existing units, and the design of equipment. These uses were demonstrated every day to large audiences.

Refining and processing plant was well represented not only by designers and constructors of complete units but also by the makers of all types of components and ancillary equipment.

Fourteen of the larger producing, refining, and marketing companies of the U.S. were responsible for interesting exhibits generally showing the ramifications of the industry. In particular the main stress was on research and on services to industry and mankind.

It was perhaps to be expected that an oil industry exhibition in the United States would be sparsely populated with exhibits from Great Britain. Whatever the cause, and no doubt it bore a strong relation to circumstances beyond the control of the individual exhibitor, it was disappointing to the British delegates that so few were represented. Those exhibitors from Britain who had individual stands were:

Council of British Manufacturers of Petroleum Equipment—A source of information concerning the activities of its members and a useful exhibit of its publications.

Emco Brass Manufacturing Co. Ltd.—Service station and transport equipment, delivering hoses, etc.

Newman Hender & Co. Ltd.—Valves of all types for the oil industry.

Pulsometer Group.—

B.A.L./Thomas Boorn & Co. Ltd.—Pressure hose, gaskets, joints, including submarine hose of neoprene reinforced with nylon ply.

Joseph Evans & Sons (Wolverhampton) Ltd.—Reciprocating, hydraulic, and piston pumps.

Pulsometer Engineering Co. Ltd.—Pumps for refinery and chemical plants, aircraft fuel pumps, and high vacuum pumps.

Skyhi Ltd.—Jacking systems and lifts.

Peter Spence Ltd.—Chemicals and catalysts for use in petroleum refining.

British firms represented on stands of their American associates were:

Coventry Gauge & Tool Co. Ltd.
Crosby Engineering Co. Ltd.
Davey, Paxman & Co. Ltd.
Foster Wheeler Ltd.
Kellogg International Corporation.
Metal Containers Ltd.
Ruston & Hornsby Ltd.
Worthington-Simpson Ltd.

The CBMPE stand was a centre for enquiries concerning British supplies for the petroleum industry

America's Oil Industry Visited

Subsequent to the Congress the Editor of the IP REVIEW participated in the official tour which visited oilfields and establishments in the Gulf Coast area from Houston, Texas, to New Orleans, Louisiana. Later he also had the opportunity of private visits to the Linden, New Jersey, and Baton Rouge, Louisiana, research establishments of Esso Research and Engineering Company, the research centre at Paulsboro, New Jersey, of Socony Mobil Oil Company, and the Baton Rouge refinery of Esso Standard Oil Company. He was thus able to inspect a cross section of some of the more important and interesting aspects of oil operations and his impressions are recorded briefly in the following account. Unfortunately, space does not permit full details being given.

This opportunity is taken to express the Editor's thanks to all those officials of the companies concerned who went to considerable lengths to make his visit of great interest. All freely gave of their time and knowledge.

HUMBLE RESEARCH CENTRE

The Houston Research Centre of Humble Oil & Refining Company, the scene of the first visit of the tour, houses most of the Company's groups working on exploration and production research. It is located on a 15-acre site in south-western Houston and contains about 110,000 square feet of space divided into over 300 rooms on three floors. There is

also a separate service building providing warehouse space, a seismic cable shop and a carpenter's shop, core cutting rooms, and similar facilities.

Each laboratory in the main building has been designed and equipped for its specific purpose and is of varying size to meet that purpose. Offices adjoin each laboratory, conference and assembly rooms are available, and the fine technical library maintains a file of over one hundred thousand abstracts covering petroleum exploration and production.

Exploration Research

The exploration activities of the Houston Research Centre are divided into three main groups—geophysical, geological, and geochemical.

Geophysical Research—the main work of this group is to improve existing and to develop new methods of applying measurements of the earth's physical properties to oil search. Four major projects are in hand, these relating to seismic, gravity, and magnetic exploration, and to well-logging, as well as continuous development of new geophysical methods.

Humble Oil & Refining Company's Research Centre at Houston, Texas

Seismic research involves fundamental and theoretical studies of principles, and general problems of application in the field and interpretation of results. Gravity research is focused mainly on instrumentation and data interpretation, whilst the magnetic research is continuously concerned with basic studies of magnetic properties of rocks as well as application of instrument data.

Various problems are studied in the field of well-logging research, including instrumentation and interpretation of measurements made in wells, acoustic properties of deep formations, and methods of measuring dip. Considerable knowledge has been gained from radioactive and thermal studies and in well-testing research a new type of packer has been developed to the scale-model stage.

Closely related to the Geophysics Research group is a Seismic Service group which services, maintains, and improves seismic equipment. These groups assist field parties in selecting the best techniques for specific areas.

There is also a Geophysics Experimental Station at Friendswood, near Houston, and a Marine Geophysics Research Station at Galveston. The former provides facilities for field-type tests and the latter has several boats for experiments with marine-type techniques.

Geological Research—Many useful functions are performed by this group, which conducts investigations of broad scope as well as dealing with unusual problems as they arise. In recent years information has been gained on faulting, on fracture porosity in carbonate rocks, and Recent and Pleistocene sediments.

Regional projects include a study of the buried Llanoria structural belt across Texas and New Mexico, and on present-day reefs in the Bahamas.

Current activities include studies of salt domes, the compaction and cementation of sandstone, and ground water problems.

Geochemical Research—Fundamental research of long-range significance is carried out by this group and at present includes studies of clay minerals, carbonate rocks, and geological age determination. Clay minerals are of particular interest in the Gulf Coast area and the carbonate rocks study seeks knowledge of their formation. Both may lead to a better knowledge of geologic history and thus aid oil search.

Production Research

For over thirty years Humble has been active in seeking ways of increasing oil recovery from reservoir rocks and in finding methods to drill deeper and better wells at lower cost. These studies are still a major part of the Production Research Division's work and involve the investigation of reservoir behaviour, fluid mechanics, behaviour of reservoir fluids, and well log interpretation.

The study of reservoir behaviour involves a mathematical research project employing an electronic calculator to solve complex equations defining flow in porous rocks. For the prediction of a field's behaviour, to define its producing characteristics, and to give data for establishing good operating practices, an electronic reservoir analyser is used.

Other aspects of production research relate to well drilling and completion problems. They include research into the properties of drilling muds and other matters concerning mud mixtures and flow systems. The causes of loss of much circulation and well cementing problems are continuously under investigation.

Corrosion research in the Production Research Division is concerned with inhibitors for hydrogen sulphide corrosion in wells. The development of new subsurface instruments for various uses is also undertaken and a project involving the interpretation of well temperatures is in hand.

Petroleum Engineering

The Petroleum Engineering Division not only carries out its own projects but also co-operates with the Production Research Division in many ways and also provides some technical services. Gun perforation of casing is studied at Pierce Junction, near Houston, and the group co-operates with equipment makers and designers in developing more efficient drilling and production equipment.

Drilling techniques are studied in the Centre and a special group is engaged in research on marine operations. Various technical service groups include (1) a Reservoir Engineering Laboratory where hydrocarbon and core analyses are made and where temperature and pressure surveys are handled; (2) a Formation Evaluation and Reservoir Engineering Training group to formulate and co-ordinate plans for

The British contingent on the Gulf Coast Tour included G. L. Lawlor (British Petroleum Co. Ltd), *Clifford Simpson* (BP (West Africa) Ltd), *Sidney H. Bean* (Edward Wiggins & Co. Ltd), *H. E. Barry* (Shell-Mex and B.P. Ltd), *and E. S. Tucker and F. G. Thackeray* (Petroleum Press Service)

formation evaluation programmes and to implement the Company's training programme; and (3) the Computing group to assist other personnel in developing the numerical results necessary to engineering design and analysis. It has a digital computer, an electronic reservoir analyser, and potentiometric-type oil reservoir models for the solution of reservoir pressure and flow problems.

OIL OPERATIONS IN TEXAS AND LOUISIANA

From the realm of research as seen in Houston, the second day of the tour took the party into the practical side of oil-field operations in Texas. The first call was to the Friendswood oilfield of the Humble Oil & Refining Company, some 17 miles southeast of Houston. To reach this field the route was via the South Houston oilfield which it was stated had been in production for about 21 years, although no new drilling had been undertaken during the last 15 years. As the field is drilled on a salt-dome it is non-prorated and production was understood to be about 20 barrels per well per day. In passing it was noted that dwelling houses and derricks were in close proximity, the latter remaining in place because of the need to pull tubing occasionally on account of corrosion. Some signs of surface subsidence due to the production of oil, gas, and water were also noted.

A general view in part of the Friendswood oilfield

Friendswood

The Friendswood field, which consists of a productive area of 4300 acres, was discovered by Humble in 1937 and is now almost wholly-owned by that Company. This has resulted in a most orderly development on a 20-acre well spacing.

Production is from the Frio formation and from the Vicksburg of Oligocene age. The structure is a buried salt dome, and production is by water-drive. Deeper drilling is in progress to test the possibilities of formations down to the Wilcox sands.

The crude oil has a gravity of 29° API, a high gasoline yield, and low sulphur content. It is all refined in the Baytown refinery.

The Goose Creek field, Texas, was once dry land

A total of 233 wells have been drilled in the field, 19 of these being dry holes. During June 204 wells were producing at the rate of about 28,000 barrels per day prorated to ten days production for the month. Total production to 1 May 1959 had been 238 million barrels. When prorationing came into force at the end of 1948 the reservoir was producing about 55,000 barrels per day and is still capable of that production.

All gas from the Friendswood field is sent at about 60 psi through 3- to 12-inch gathering lines to the Company's gas plant at Clear Lake, about 5 miles to the southeast. This plant, which processes gas from other fields also, has a capacity of 150 to 200 million cubic feet daily and was currently taking about 26 million cubic feet per day of casinghead and spent gas-lift gas from Friendswood. After removal of propane and a butane-natural gasoline product, most of the residue dry gas is returned to the field for use in gas-lift operations.

The problem of the disposal of some 25,000 barrels a day of salt water produced with the oil is dealt with mainly by tidewater disposal. Corrosion-resistant pipelines convey the water to a central plant where any remaining oil and most of the solid material are removed. The water then goes by a

drainage ditch to tidewater at Clear Lake. Two supplementary disposal wells are located in outlying areas for return of salt water to formation.

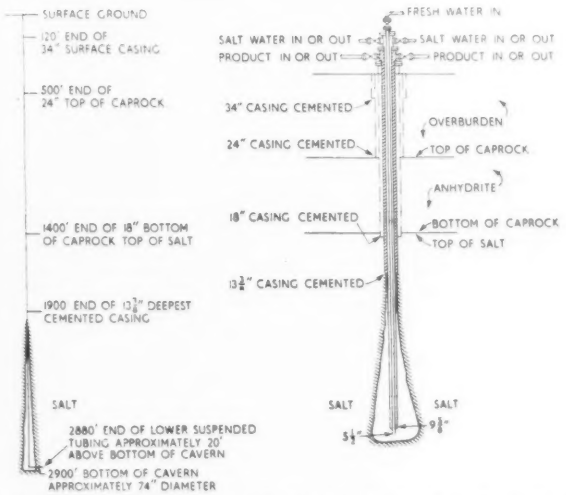
Goosecreek

From Friendswood the journey continued on to the Goosecreek oilfield, which is understood to be the first oilfield in which a study was made of subsidence due to the production of oil and gas. It was particularly noticeable that many of the derricks over producing wells were standing on small islands in a bay of the sea, whereas when first drilled the whole area was dry land. It was stated that the surface drop had been as much as 18 to 20 feet in some places.

Underground Gas Storage

There are nearly 300 salt domes or salt structures in the Gulf Coast area of Texas and Louisiana. The domes are really buried pillars up to eight or nine miles high above the mother bed and consist of 90 to 95 per cent of salt, the remainder being mainly anhydrite.

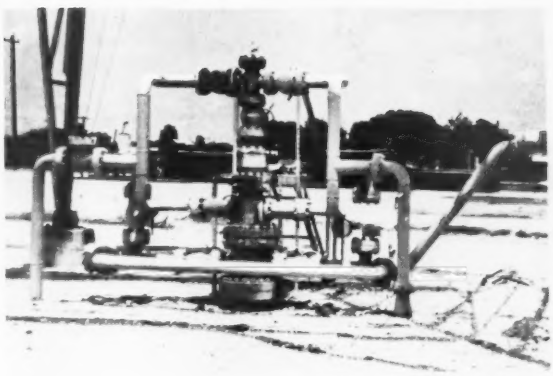
The next stop in the tour was to Mont Belvieu, on the Barbers Hill dome, where Warren Petroleum Corporation has established underground storage in the salt for gasoline and liquefield petroleum gases, including butane, propane,



Underground gas storage. (Left) *A scale drawing of a typical storage well and* (right) *a typical casing programme (not to scale)*

ethylene, and mixed gases. The Barbers Hill dome is about two miles in diameter, the top of the salt is about 1400 feet from the surface, the cap-rock being 700 to 900 feet thick.

The caverns are made by leeching out the salt with water, the brine being stored in a pit and used to replace any LPG removed from storage. Two sizes of well are used at the Mont Belvieu terminal, one to receive or produce 18,000 barrels of product per day, and the other 70,000 barrels. The deepest cemented casing string in the former is $9\frac{5}{8}$ inch diameter, and in the latter $13\frac{3}{8}$ inch. Fractionation and refrigeration plant is installed and six pipelines connect with the Corporation's terminals at Port Arthur, Fannett, Baytown, Houston, and Texas City, and also with most refineries in the area.



Gas storage well at Barbers Hill

The accompanying diagrams show a typical 250,000-barrel well, the cavern of which has a vertical height of less than a thousand feet and a bottom diameter of only 74 feet. The vertical height could be increased to 3000 feet to give, with a bottom radius no greater than 75 feet, a capacity of three million barrels.

This form of storage for 250,000 barrels is estimated to cost about 30 to 40 cents a barrel, exclusive of well-head equipment, compared with about $4 per barrel for conventional tankage.

Spindletop

On then to Spindletop where, on 10 January 1901, the famous Lucas well blew in from a depth of 1160 feet with an estimated flow of 100,000 barrels of oil per day. In nine days it produced 800,000 barrels and started unprecedented activity never again surpassed in the history of oil.

The site of the well is now occupied by the Lucas Monument and here a stop was made to examine some of the equipment and tools used on the original well. Incidentally, it was the Lucas well which first directed attention to the use of rotary drilling in Texas. Also, the party were privileged to hear short addresses from Dr Paul Weaver and James A. Clark.

James A. Clark explains a point to George Sell, IP editor (right) *and F. G. Thackeray and E. S. Tucker (PPS)*

Paul Weaver (right) *with Sidney Bean at Spindletop*

The former is now teaching geology at the Texas A and M College, was for 27 years with the Gulf Oil Corporation, and had been with the Pearson Group in Mexico and in England. Mr Clark is joint author of the book "Spindletop", and is well-known in the writing and editorial field.

Dr Weaver said that at Spindletop and nearby, "there were successfully initiated drilling, geophysical, and refining specialities of engineering more numerous than in the region of the Drake Well". In the 58 years since 1901, from 365 hectares, twenty-one million cubic metres of petroleum had been taken.

The Lucas well marked the successful adaptation of a drilling technique previously only used for small water wells. Lucas might have used other methods with which he had had contact, but he calculated correctly, said Dr Weaver.

A large percentage of the Spindletop crude, which was designated coastal "A" crude, was lubricating oil stock but one disdained by the refiners of Pennsylvania grade crude. Nevertheless, the refiners at Beaumont and Port Arthur found how to fit the product to the market. A refinery innovation invented in the area was the Alchlor process under the direction of Dr McAfee. When Coastal "B" and "B-2" crudes were discovered in 1926 and the early 1930's, refinery processes were completely reorganized.

A drilling tender built by Levingston

An important "precedent in geology" was the application of micropalaeontology to the identification of marker horizons in the early twenties by Dr R. T. Dumble of the Rio Bravo Oil Company, then operating in Spindletop. Also, Spindletop was the first place in the United States where the Eotvos torsion balance was used for a gravity survey.

James A. Clark told how Captain Lucas was attracted to Spindletop by Patillo Higgins, son of a local gunsmith, and who, for ten years and in spite of every form of technical, scientific and financial opposition, had held tenaciously to the idea of a great oilfield there.

The Lucas gusher was not just another oil well or the first big well in Texas—it was the birth of the liquid-fuel age. Apart from its productive capacity, a most important fact was that it was on tidewater, while all other important fields then were hundreds of miles from tidewater.

Mr Clark concluded that on the first (1892) letterhead of his Gladys City Oil, Gas and Manufacturing Company there were drawings of gushers, tankers, oil cars, and refineries.

A huge 14*-leg De Long type drilling barge under re-construction at the Levingston Yard*

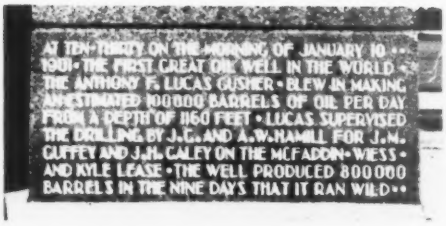
Offshore Drilling Equipment

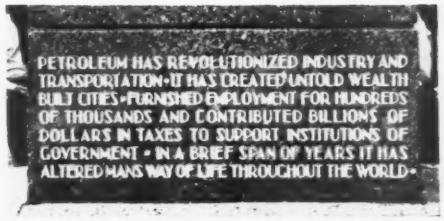
As a respite from the oil-producing activities of the industry, the next stop was at Orange, still in Texas, to visit and inspect the plant of the Levingston Shipbuilding Company where large drilling barges and tenders are made for use in swamp and in offshore locations.

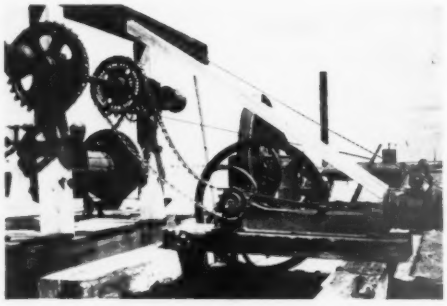
Models were demonstrated and details were given of some of the equipment which had been produced by the Company. As an example, reference might be made to the submersible drilling barge *Rome*, completed early in 1959. Moulded dimensions are: length 190 feet; breadth, 50 feet; depth of hull at sides, 14 feet. It is a slotted-hull type barge, the slot being 86 feet by 10 feet, with derrick substructure and superstructure built above the main deck. The barge was designed to drill to 20,000 feet or over, drawworks being a National 130 powered by four Caterpillar D-397 turbo-charge engines. Rotary table was an Ideal M.S. 27½ W/Fawick inertia brake, powered by Caterpillar D-375. Auxiliary equipment was of similar standard.

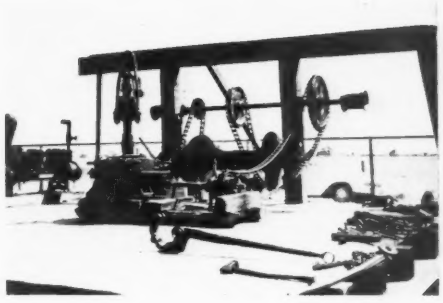
Offshore drilling tenders built by Levingston are exemplified in those produced for the Reading and Bates Offshore Drilling Company for use in contract work. These were non-self-propelled vessels of 260 feet moulded length, 54 feet

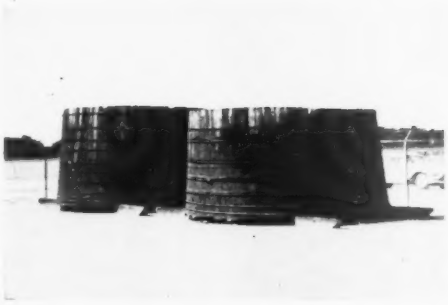
At Spindletop

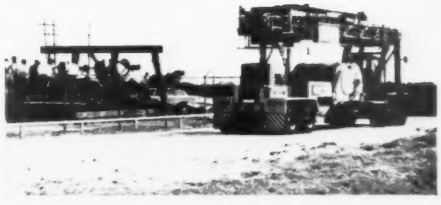

AT TEN-THIRTY ON THE MORNING OF JANUARY 10 ··
1901 · THE FIRST GREAT OIL WELL IN THE WORLD ··
THE ANTHONY F. LUCAS GUSHER · BLEW IN MAKING
AN ESTIMATED 100 000 BARRELS OF OIL PER DAY
FROM A DEPTH OF 1160 FEET · LUCAS SUPERVISED
THE DRILLING BY J.G. AND A.W. HAMILL FOR J.M.
GUFFEY AND J.H. CALEY ON THE MCFADDIN-WEISS-
AND KYLE LEASE · THE WELL PRODUCED 800 000
BARRELS IN THE NINE DAYS THAT IT RAN WILD ··

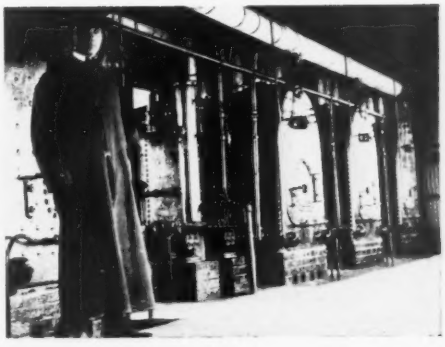

PETROLEUM HAS REVOLUTIONIZED INDUSTRY AND
TRANSPORTATION · IT HAS CREATED UNTOLD WEALTH
BUILT CITIES · FURNISHED EMPLOYMENT FOR HUNDREDS
OF THOUSANDS AND CONTRIBUTED BILLIONS OF
DOLLARS IN TAXES TO SUPPORT INSTITUTIONS OF
GOVERNMENT · IN A BRIEF SPAN OF YEARS IT HAS
ALTERED MANS WAY OF LIFE THROUGHOUT THE WORLD ·











In the centre is the Lucas Memorial at Spindletop and below is seen Paul Weaver addressing World Petroleum Congress delegates during their visit. To left and right at the top are the inscriptions carved on the memorial, while immediately below is some of the equipment and tools used to drill the well. Below these are (left) *two of the lease tanks used in those early days and* (right) *a modern portable rig brought along for comparison. By contrast, the two pictures at the bottom were taken in* 1903 *by the late William Sutton, who was at one time a member of the IP Council. The lease tanks on the left were on the nearby Hogg-Swayne tract and on the right is an interior view of a boiler house at the Garrison pump station*

Dual-producer of Humble on the Bayou Boeuf

breadth, and 16 feet 3 inches depth at sides. Accommodation provided for fifty men is air-conditioned and includes dining facilities to seat 32 at a time and recreation rooms.

A 75-foot boom crane gives facilities to unload pipe and stores from the supply boat and to transfer material to the drilling platform as required. Water tanks allow for 1260 barrels of fresh water, 13,000 barrels of drilling water, and 312 barrels of potable water. Capacity of the active mud pit is 554 barrels and of the reserve mud pits 1538 barrels. Fuel oil storage totals 804 barrels.

A helicopter flight deck, 64 feet by 54 feet, covers the forward end.

In Louisiana Swamp Country

At the end of the second day Texas had been left and the third day saw the party travelling towards the Avery Island district of Southern Louisiana to visit the Bayou Boeuf area and in particular some oilfield operations of the Humble Oil and Refining Company.

Located in the swamp area this field is one of sixteen producing and drilling areas which the Company operate between here and the Texas border to the west. It is Gulf Coast piercement dome basin and it is expected that eventually the Company will have as many fields in the Gulf of Mexico as on land. Production is from the Miocene, depths being up to 12,000 feet. The majority of the wells are dual producers using two tubing strings. Wells are comparatively closely spaced at 200 to 300 feet intervals.

Simulated blow-out at Cameron Iron Works

Cameron Iron Inc provided the local beauty queen Elise Webster (Miss Morgan City) *to serve coffee. She is seen here with* (left) *George Heseldin* (Motherwell Bridge Contracting and Trading Co. Ltd) *and John H. Grubb* (manager of Cameron's International Division).

Travelling by barge through the swamps brought one's mind back to the film "Louisiana Story", except that the vegetation was not so dense as in the film and no alligators were to be seen.

Cameron Iron Works

On then to the Morgan City plant of Cameron Iron Works Inc where blow-out preventers and other equipment are reconditioned and serviced. This was an interesting and useful plant, capable of dealing with major repairs and maintenance of equipment. During the necessarily brief stay there the efficiency of the Company's blow-out preventers was demonstrated. A blow-out was simulated by water under considerable pressure forced up through a well-head. The resulting fountain was quickly killed when the preventer was put into action.

A Drilling Equipment Store

Shortly after leaving Morgan City en route to New Orleans, a quick call was made to see the large drilling equipment warehouse which Shell Oil Company opened on the Bayou Boeuf, some 50 miles south of Baton Rouge, about a year

The tour party on the Bayou

A Shell Oil Co. photo

Air view of Shell's terminal at Morgan City. Main yard is in the centre with warehouse and pipe racks. Offices and radio tower on the left

A Shell Oil Co. photo

Loading casing on a barge at Morgan City. A 3- or 4-ton barge can be loaded in one day compared with 7 or 8 days if trucks or rail cars were used

ago. This was necessitated by the increasing extent of the Company's operations in south-central Louisiana and the Gulf area.

From this 51-acre site practically everything needed on a well can be on its way to its destination within a few minutes, if necessary by helicopter. Shipment can be made by any type of transport—boat, barge, seaplane, railroad, and road. Being located on the Bayou, ready access by water to offshore and bayou operations is provided.

The main warehouse is 60 feet by 100 feet and outside racks are provided for about 25,000 tons of tubular material, that is drill-pipe and casing. Stock at the terminal represents about 3-months needs and is valued at around $3 million.

A similar terminal was opened at Harvey, Louisiana, in 1956 to supply southeastern Louisiana and offshore areas near the mouth of the Mississippi.

Offshore Operations

Final visit of this tour was made to the Bay Marchand oilfield of the California Company. This field is about 75 miles south of New Orleans and 10 miles from the town of Leeville.

The centre of the field is about 5 miles out to sea from the nominal coast line, this being somewhat indeterminate as the coastal belt consists mainly of marshy delta of the Mississippi.

The dome on which this field is located is said to be one of the largest piercement type salt domes in the area, being some six miles in diameter. The dome was discovered by seismic operations, production being from several sands of Miocene age.

There are fifteen completed wells and drilling is in progress continually at a number of sites in the Bay. Wells are also being drilled onshore on the edge of the dome. At the centre, the top of the dome is about 2000 feet below sea bottom. Production is obtained from 6500 to 9000 feet. On the edge of the dome the depth is about 12,000 feet.

The journey to one of the drilling sites was made in a supply launch driven by two 350-hp diesels, this type of fuel

The twelve-well rig and tender visited in Bay Marchand

Tender of the well visited by the party

A producing site in the Bay

Offshore well drilling by The California Co. in Bay Marchand

being used in preference to gasoline as a safety factor. Depth of water at sites varies from 25 to 50 feet and the type of drilling structure in use was that in which a submersible barge formed the base on the sea-bed, the top structure being built up on top of that. Stores, living quarters, and similar facilities were installed on a mobile tender which could quickly be moved to safety in the event of a storm. When drilling is completed and oil production established, the tender and drilling equipment are removed and permanent production facilities built up as required.

It was particularly interesting to note that the site visited was one on which twelve wells were to be drilled, the only equipment necessary to be moved being the rotary table and the crown block. This operation was said to take not more than six hours. By use of directional drilling techniques, each of the twelve wells would be on a 40-acre spacing at the producing depth, thus covering a total of 480 acres.

RESEARCH AND PRODUCT DEVELOPMENT

Passing from the drilling and production aspects of the petroleum industry, the editor's journey went on to fundamental research in the realm of refining and utilization of petroleum products. As already mentioned, he was privileged to visit two research centres of the Esso Research and Engineering Company and one of the Socony Mobil Oil Company's establishments.

Gordon Morris, the very informative guide in Bay Marchand

ESSO RESEARCH AND ENGINEERING COMPANY

Although the research and engineering activities of Standard Oil Company (New Jersey) were begun as a separate company only in 1927 with the formation of Standard Oil Development Company (now Esso Research and Engineering Company), it is nearly 70 years since George Saybolt first established inspection laboratories in which products from Standard Oil Company's various refineries could be examined regularly and quickly to determine uniformity of quality. These laboratories were at Bayonne and Linden, New Jersey.

A major step took place in 1919 when a Development Department was started at Linden to carry on a truly integrated programme of research and development.

Since the formation in 1927 of a separate company, the facilities for this type of work have been very much extended. Thus to-day the Company has more than 3000 persons engaged at Linden, and about 550 in affiliated laboratories in Baton Rouge, Louisiana. In addition, a new centre is being established on a 675-acre site at Florham Park, New Jersey, about 20 miles west of Linden.

It is in the Esso Research Laboratories, which incidentally are closely allied with affiliated companies in England, Canada, and France, that such developments as the fluid solids technique were originated and have been extended for use in catalytic cracking to hydroforming and coking. Among other major process developments of the laboratories have been alkylation, solvent extraction, Hydrofining, and Powerforming.

The contributions which the company has made and is making in the chemicals-from-petroleum field are also many.

Not a landing from Mars. A car on the MAD bench at Linden

They include butyl synthetic rubber, various polymers, solvents, agricultural chemicals, and so on, while the search for new products and new processes continues.

Linden

Located on a 56-acre site near the Bayway refinery, the Linden laboratories occupy nineteen buildings, all of which are extremely well laid-out and landscaped. The emphasis in these laboratories is in two main fields.

The first is the development of methods for the examination of petroleum products to ensure that the quality is uniform at all times, and also to study various physical and chemical properties of the products in relation to the conditions under which, or the purpose for which, they will be used.

Much of the apparatus in the laboratories, and particularly that used in routine and referee tests, is to IP and ASTM standards, but special methods and equipment have been devised and are used to meet special needs. One particularly interesting piece of equipment noted was the Mileage Accumulation Dynamometer (MAD) used for testing fuels and lubricants and on which eight unmanned cars can operate simultaneously. Controlled by punched tape from one central point, normal driving operations such as starting, stopping, acceleration, and so on can be simulated continuously and the conditions exactly repeated with different oils or fuels in the cars.

A furnace with windows at Linden for fuel oil combustion studies. The inside, which may be at over 2000 F, can be seen and photographed

The IP editor with Bob Dunne, of Esso Research and Engineering Co. Press Bureau, Public Relations Division

The second, and at least equally important, field in which Linden functions is the initial or laboratory stage of development of new products. It is said that the Company never has less than one thousand research projects under way at any moment.

One building at Linden, although comparatively small in size, is of very great potential. It is the nuclear radiation laboratory. This is the first of its kind in the petroleum industry, although the Company has been active in atomic research for over twenty years and has carried out research at the Brookhaven, New York, National Laboratory since 1952. The aim of the Linden radiation laboratory is to seek fundamental knowledge on the effect of nuclear radiation on petroleum and petroleum processing.

Among the projects upon which the Company is now working is the development of high-energy solid propellants for the U.S. Department of Defence. At the other end of the scale it is of interest to record that one result of a programme to find new ways of using petroleum to serve man's needs has been a stationary snow-melter burning heating oil. Research is also being carried out on a fuel cell for the direct conversion of hydrocarbons to electricity.

Yet another major project under examination relates to the rapid fueling of large jet aircraft. A full-scale airport fueling system and wing tanks are simulated in a test apparatus to enable new designs of equipment to be evaluated. A large commercial jet airliner uses 20,000 or more gallons of fuel for a long-range flight. To minimize loss of time, fuel-flow rates of 1200 to 1500 gallons per minute are desirable and these conditions can be simulated in the Linden test equipment.

Enjay Laboratories

The Linden site also includes the laboratories of the Enjay Company, petroleum chemicals marketing organization of Standard Oil (New Jersey), the Enjay Laboratories having

An Esso Standard photo

The extent of the Baton Rouge research laboratories can be judged from this general view

been established at Linden in 1955. Today, application of polymer products is one of its primary functions and the polymer laboratory is fully equipped to compound and process quantities of Butyl rubber up to several hundred pounds.

Similarly, full facilities are available for the development of additives for lubricants, gasoline, fuel oils, and industrial oils, and for a full range of chemical intermediates.

Baton Rouge

The Baton Rouge laboratories, which are in close proximity to the parent Company's refinery, are mainly concerned with pilot plant work to bring to the commercial-operation stage processes which have been basically devised in the laboratories at Linden and elsewhere. There are over fifty pilot plants ranging in size from bench to near-commercial scale and in fact products can and are produced in sufficient bulk for customers to examine them for their application on a large scale. In addition, office and laboratory buildings provide over 40,000 square feet of working area and another 25,000 square feet is used for supply and construction and for maintenance services.

Total staff at the research centre, which is among the largest in the U.S.A., is about 550. Of these, about 140 are fully qualified chemists, or chemical, mechanical, and electrical engineers.

Administration is under the control of a director and an associate director, with five assistant directors each responsible for particular phases of the research operations. A patents, library, and information section, with an administrative assistant in charge, is also provided for use by all divisions.

Long Range Research

A considerable portion of the work at Baton Rouge is what is termed long range research, or exploratory research into processes, and their operation and engineering. Generally speaking, about twenty per cent of the operations of this division are concerned with fundamental work on catalysts designed to increase the understanding of their action. The remainder of the operations of the Long Range Research division is devoted to such specific purposes as the improvement of product quality or the modification or development of a process to attain a desired end product.

Thus, the recording of variables in operations is important, and data-gathering units for the recording of temperatures, flow rates, etc., are in much use. The use of tape recordings for this purpose is at present receiving attention in order that units which operate on a time cycle can be automatically controlled.

Pilot Plants

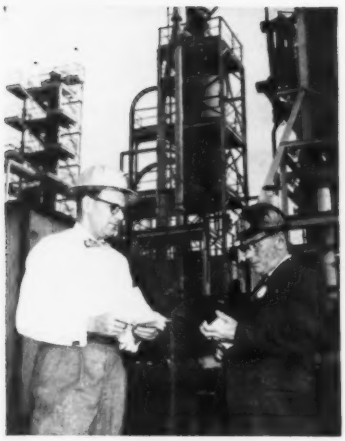
The pilot plants are no doubt the most interesting equipment in the Baton Rouge Centre, particularly on account of their wide variety and in some cases their versatility. Thus, one plant which was first put into operation in 1937, having an output of up to 100 barrels per day of product, has played many roles and is still in operation. It was first used for work on hydrogenation of oils and later played a major role in the development and modification of the fluid catalytic cracking process on a commercial scale.. Investigation of possible improvements of this process are still going on. This plant has also been used for experimental work in conjunction with the U.S. Bureau of Mines on the retorting of oil-shale, the shale being ground to the fluid solid state. The Company's fluid coking process was also developed to the pilot stage in this unit.

Also for use in connexion with the fluids solid technique is a pilot plant, the reactor of which is 15 inches in diameter and 72 feet long. Its capacity is 50 barrels per day and it has been used for investigations on Fischer-Tropsch, hydroforming, and fluid reforming.

The medium scale pilot plant building contains a number of flexible units of $\frac{1}{2}$ to 1 barrel per day capacity which are used

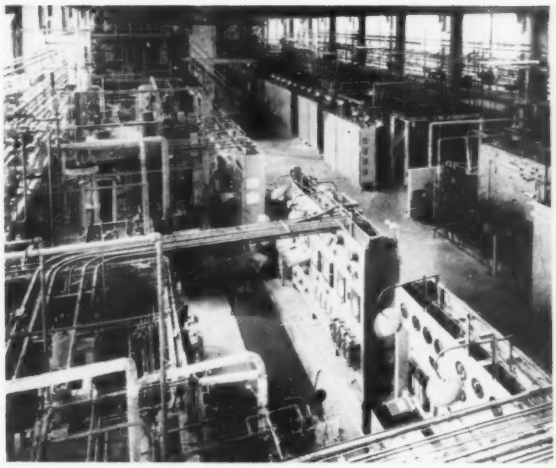
Checking one of many valves on a catalyst aging unit at Baton Rouge

An Esso Standard photo



Jim Carr explains a point to the IP editor in the Baton Rouge pilot plant area

An Esso Standard photo



An Esso Standard photo

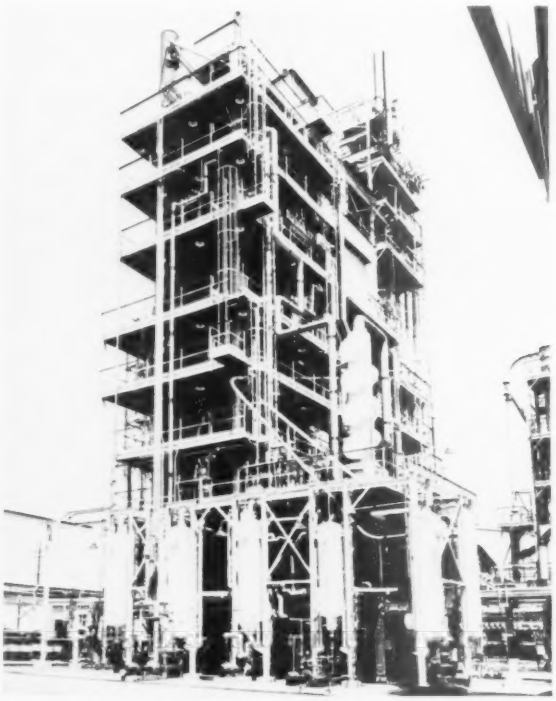
Part of the interior of the pilot plant at Baton Rouge

for a variety of operations, including hydrofining, catalytic reforming, and high pressure reactions up to 4000 psi.

Reactors for work on oxo-alcohols at 3000–5000 psi are operated behind concrete walls as a safety precaution. In addition there is a packed vacuum still equipped with two towers for extractive distillating. This plant is used as a service unit in relation to operations in the parent Company's refineries. A small fluid catalytic cracker of about half a barrel per day capacity, and operating exactly as the large-scale unit, is also installed.

The 100-barrel per day pilot plant at Baton Rouge on which fluid catalytic cracking and fluid coking were proved semi-commercially

An Esso Standard photo



Chemicals from Petroleum

Approximately one third of the investigations in this section is devoted to the actual basic chemicals produced from petroleum, the remainder being concerned with process research and the production of materials in sufficient quantities for potential users to make their own investigations as to market requirements. Consequently, the pilot plant work is among the largest in operation anywhere. Actually, during the visit, a new type of Butyl rubber was being produced in a pilot plant in quantities sufficient to meet market requirements pending completion of a commercial-size plant.

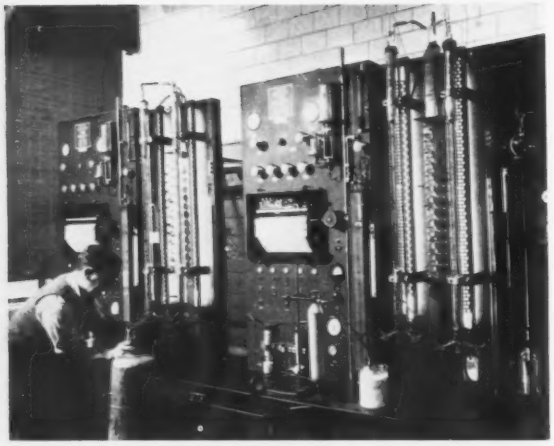
In the chemicals from petroleum operations an all-purpose pilot plant of 1–3 tons per day capacity is used in process development work. This plant is designed for stage-by-stage operation with facilities for storage of inter-stage products.

Mathematics

The importance of mathematics in relation to plant operation is given due prominence at the Research Centre, and the work of this division is in four main divisions, the mechanical apparatus available including an analogue computer and three IBM machines. The computer facilities at the Linden laboratories can also be called upon.

The first division is mainly concerned with statistical analysis, the training of research staff in mathematical techniques, and programme planning. Where desirable, use is made of non-company consultants who visit the centre regularly. The second and third divisions, dealing with advanced mathematics and special studies respectively, carry out advanced studies arising from the first division and also prepare mathematical models to cover process work, plant design, and control systems. The work of the third division in particular includes the simulation of physical processes, the planning of laboratory and pilot plant investigations, and the expenditure of time, money, and manpower.

The fourth division is concerned with the use of machines for data recording, calculation, business records, and so on.



Quality of LPG is tested at Paulsboro in this Podbielniak low-temperature fractionation equipment

Analytical

Baton Rouge Research Centre has also played its part in the development of equipment for analysis and testing of petroleum products, this section also carrying out all analytical work for the Centre.

Thus, research was on hand into the use of a capillary (0·01 inch diameter) column for chromatographic analysis and the Esso micro vapour pressure apparatus was developed here from basic principles.

A considerable amount of automatic equipment was in evidence.

SOCONY MOBIL OIL COMPANY

Organized research in petroleum by Socony Mobil Oil Company Inc is nearly 50 years old, for it was in 1913 that the then Vacuum Oil Company established a formal research programme at its Rochester, New York, refinery. In fact, however, the Company's interest in research dates from the setting up of its first laboratory three-quarters of a century ago.

To-day, Socony Mobil's integrated research programme gives employment to 1600 people and costs about $22 million a year. The Company has three main centres of research in the United States—Paulsboro, New Jersey; Dallas, Texas; and Brooklyn, New York.

The Paulsboro Laboratory is concerned mainly with fundamental and applied research in the chemistry and refining of petroleum products, as well as process technical service and product technical service, and will be described more fully in this article.

At the Magnolia Field Research Laboratory at Dallas the emphasis is on exploration and production problems. It is in this establishment that techniques for increasing the ultimate recovery of crude oil from known fields have been developed and improved, and also where methods and instruments for the more accurate location of oil deposits have been devised.

The Brooklyn Laboratory deals mainly with the surveillance of product quality. Assistance is also given to customers in regard to the proper product for a particular purpose and the proper use of products.

More recently and an extension of the long-range research programme, Socony Mobil, and nine other industrial concerns of widely varied interests, are constructing a 5-megawatt nuclear reactor at Plainsboro, near Princeton, New Jersey. The Company is also constructing its own nuclear research laboratory, also near Princeton, where it will install the latest type of equipment for the study of nuclear physics and radiation chemistry as applied to petroleum technology.

Paulsboro Laboratory

Research at Paulsboro was started in 1924 by the then Vacuum Oil Company, the work then being concerned with lubricants. To-day, all products of petroleum and others related to the processing of petroleum come within the orbit of the laboratory, and investigations include basic and analytical research, process and product development, product application, and petroleum chemicals.

Basic and Analytical Research

The facilities at Paulsboro for the carrying out of basic and analytical research are really excellent and adequate. A large number of separate laboratories are provided in each of which some particular aspect of research is under investigation by a team of qualified chemists, or in some cases by an individual trained in some special technique.

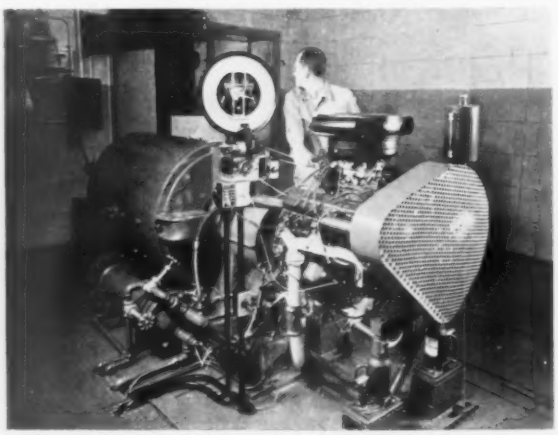
It was noticed, for example, that in the field of hydrocarbon reactions work was in progress on the dehydrogenation of *cyclo*hexane. There is no limit to studies which have been or are yet to be made. Oxidation studies are continually being made and include pre-combustion and combustion reactions of gases.

Catalyst research is also a feature of Mobil's work and has been wholly carried out at Paulsboro.

In the analytical field the primary objective is precise and accurate measurement of chemical and physical properties. For this purpose the laboratories are well equipped, not only with the usual standard equipment, but with apparatus designed for special techniques.

Among the special apparatus noted was the nuclear magnetic resonator, a high-resolution instrument used in hydrocarbon analysis by spectra and for the study of fast chemical reactions. In this instrument, experimental work

Engine testing of motor fuel in progress at Paulsboro



was in hand on petroleum waxes and also on the determination of vanadium in oils.

It was of interest also to note that apparatus was available for performing at least twenty-five varieties of oxidation tests, standard or otherwise, including the Brown-Boveri, Socony oxidation stability, BAM, B-10, German tar, and the Underwood.

Process Development

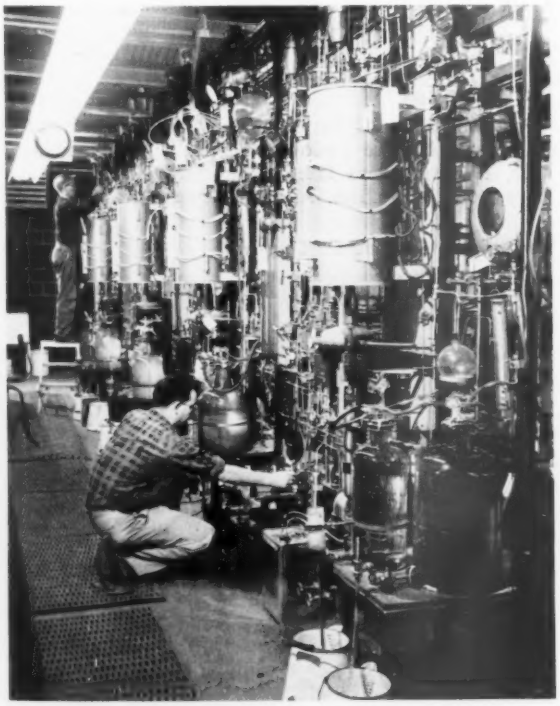
Paulsboro has full facilities for the development of processes from the bench-scale, through the small pilot plant, to the large-scale pilot plants.

Among the smaller pilot plants are four Thermofor Catalytic Cracking (TCC) units of 3 to 4 gallons per hour capacity used generally for the evaluation of gas oil fractions as feedstocks. Feedstocks from new crudes are also examined in this plant and at the time of the visit fractions from Algerian crudes were under test. Tests are often made on behalf of licensees of Socony processes, and the units are also employed in testing new catalyst formulations.

To determine the type of TCC unit best suited for a specific application, a Liquid Feed Test (LFT) can be used to evaluate catalyst or feedstock. A test run requires only about one pint of sample and results can be calculated to full-scale operation.

A plant is also provided for the manufacture of new formulations of TCC catalyst for research and development work.

A battery of pilot plants for evaluating catalysts and catalytic processes at Socony Mobil's Paulsboro laboratories. Each unit has a capacity of one gallon and its reactor holds 75 cc of catalyst



In order to study the effect of catalyst variables on naphtha, eight bench scale isothermal and adiabatic units as well as a small 3-stage reforming unit of 1-barrel per day capacity may be used. The reactor on the barrel/day unit is about 1 inch diameter and the feedstock is charged by a small pump.

For work on processes involving high pressures a special building is used and utmost precautions are taken for safety of personnel. For smaller experiments the apparatus is contained in a steel walled cell. All instrumentation is outside the cell.

The larger units are contained in chambers having three 1 foot thick concrete walls, the fourth wall being thin but with a blast wall a short distance away. All valves are operated through one of the thick walls, the recording instruments being placed in a panel opposite and away from the chamber.

Product Development

For the development and testing of new fuels and lubricants a considerable collection of mechanical and automotive equipment is used in addition to the usual laboratory tests. Thus, there are single cylinder Caterpillar engines, CLR engines, multi-cylinder engines for investigation of combustion behaviour, a section of a diesel locomotive engine for lubricant and residual fuel tests, and a host of others. Five Caterpillars are in use, four on L-1 procedure and one on D-1, and two CLR engines. These are employed about 30 per cent on research and the rest of the time on MIL approvals.

Three CFR engines are installed for standard octane rating tests and a Petter W.1 is being put in for development and correlation work.

For simulated road tests a cold chamber is used at temperatures down to minus 20°F. All varieties of road conditions can be reproduced automatically by means of a tape recording. For actual road tests to evaluate fuels and lubricants a fleet of cars is provided and fittings are installed so that any one of nine fuels can be used at will.

One laboratory is devoted to the use of light distillate oils for domestic space and water heating. Various aspects of this use are under investigation, including heat recovery, corrosion, etc.

Jet fuels are given special attention and testing apparatus is being developed.

Ancillary Services

Possibly the most important ancillary is the digital computer, which is being used also for research into the use of such instruments in the petroleum industry in general. Its application to process control and operation to determine optimum operating conditions is under examination and a coding system is being devised to simplify its use.

The computer is also available to all branches of the research establishment for solving intricate problems.

The Paulsboro Laboratory is also well provided with workshops, an excellent glass-blowing department, a photographic section, and well-equipped first-aid facilities. Total staff is about 960, about 350 of whom are technically qualified. It is the Company's policy to recruit staff also direct from high school. After a 4-year ICS course, these can become laboratory technicians.

BATON ROUGE REFINERY

Advantage was taken during the stay in Baton Rouge to pay a visit to Esso Standard Oil Company's Baton Rouge refinery, third largest in the world and the largest in the United States, with a daily crude oil capacity of nearly 360,000 barrels. The refinery celebrates its Golden Jubilee during the fourth quarter of 1959, having first operated in November 1909, on a 240-acre site with a capacity of 2000 barrels per day producing three marketable products.

Today the plant site occupies over 1100 acres and over 600 products or grades of products are made, including a wide range of chemical intermediates and specialty products.

Storage facilities for over 22 million barrels of crude oil and products are available in the refinery and 1200 acres of nearby tank farms. In 1958 underground storage for about 1·1 million barrels of liquefied petroleum gases was provided at Sorrento, about 35 miles southeast of Baton Rouge. Here, five storage cavities were leeched in a large underground salt dome.

An interesting feature of the refinery is its decor. It is not the usual mass of bright aluminum painted structures. Colours—pastel shades mostly—have been used wherever possible and with considerable taste to produce a pleasing result.

Crude Supplies

Although a subsidiary of Standard Oil Company (New Jersey), the Company has no crude oil production but purchases its supplies from independent producers. Located in the centre of important crude oil production areas, the refinery has no supply problem and upwards of 98 per cent of its crude oil is received direct by pipeline from literally hundreds of sources.

In order to balance operations, the various crudes are grouped into five basic mixtures, each designed for processing to specific requirements. Overall the pattern of output is determined to meet market demands and the proportions taken from the five basic mixtures are selected to this end.

Processing operations at Baton Rouge are under two major divisions—Petroleum Products and Chemical Products. The first of these is responsible for the manufacture of the more conventional products and specialities from liquefield gases to waxes and asphalts. The Chemical Products Division undertakes the production of all chemicals and chemical raw materials from petroleum.

Refinery Developments

Chronologically the development of Baton Rouge refinery is somewhat of a reflexion of progress in the petroleum refining industry as a whole. Not only has it followed step by step developments in the art but it has recorded many "firsts" as the result of developments by its associates such as Esso Research and Engineering Company. The significant steps in the rise to eminence of this great undertaking and the installation of major units are:

1909–1926	Increase of product output by addition of end-fired stills.
1927	250-psi thermal cracking units.
1928	750-psi thermal cracking units.
1928–1930	Two-stage crude distillation pipe stills.
	Gas absorption plant.
1931	Hydrogenation plant.
	1000-psi thermal cracking units.
1934	Gas absorption plant.
	Phenol plant for lubricating oil treatment.
1935	Barisol dewaxing plant for lubricating oil.
1938	Propane dewaxing and propane deasphalting plants for lubricating oil.
	Polymerization unit.
1940	Alkylation unit.
1942	First ever fluid catalytic cracker.
1943	Second and third alkylation units.
	Second and third fluid catalytic crackers.
	60,000 bd crude distillation unit.
1947	Wax finishing facilities.
1948	70,000 bd crude distillation unit.
	Light ends recovery unit and polymer plant.
	Solvent dewaxing plant for lubricating oils.
1953	2—75,000 bd crude distillation units.
1955	25,000 bd fluid hydroformer.
1958	Hydrofining unit.
	25,000 bd Powerformer.

Post world war II has seen many other improvements designed to increase the overall efficiency of the refinery. Thus, 1947 saw steps taken to modernize all mechanical shops, stores, and offices. As a first step a central mechanical

A general view of the huge Baton Rouge refinery of Esso Standard Oil Company

building for heavy shop activities (142,000 square feet) was erected in 1949, a light stores addition of 41,000 square feet was made in 1953 and, in 1958, the programme was completed with a 93,000 square-foot extension for light shops and the remaining light stores operations.

The first large-scale electronic computer (an IBM-705-II) to be used in the oil industry was pioneered by the refinery, and electronic equipment is used for many scientific and technical computations.

Most of the older refinery equipment has long since been replaced and pre-1941 plant represents less than 13 per cent of current investment.

Chemical Products

World war II brought about the start of chemical production at Baton Rouge, initial operations being concerned with the production of ethylene, butadiene, Buna-N rubber, alcohols, and others.

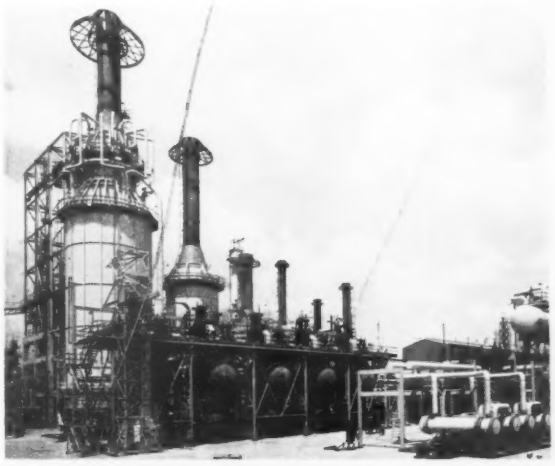
One of the most important contributions to the war effort made by the Baton Rouge refinery was in the development of Butyl synthetic rubber. The first decision, in June 1941, was to build a 10-ton-per-day pilot plant but, such was the urgency, that it was almost immediately decided to erect a 20-ton commercial-scale unit without a pilot plant study. The U.S. Government then acquired this plant and authorized construction of two additional plants; these were operated under Government ownership until June, 1955, when they were acquired by Esso. The operation of these plants also necessitated the construction of auxiliary units to extract the necessary high-purity *iso*butylene and isoprene from refinery gas and gasoline streams.

Since the end of the war there have been many major additions and extensions in this section of the refinery. Additional capacity has been provided for the production of ethylene, butadiene, ethyl alcohol, *iso*propyl alcohol, etc., and new facilities have been made available for the manufacture of benzene, Oxo alcohols, *dicyclo*pentadiene, a petroleum resin, etc.

Today Esso's Baton Rouge refinery is recognized to be the most complete or most diversified refinery in the world.

The Powerformer unit at Baton Rouge. Its capacity is 25,000 *barrels per day*

An Esso Standard photo



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New Subsidies for Oil Drilling in Australia

Four new drilling projects by three oil exploration companies in Australia will be subsidized by the Federal Government during 1959–60 under the Petroleum Search Subsidy Act.

The Minister for National Development, Senator W. H. Spooner, announced in Canberra that subsidies to be paid on these proposals, together with subsidies on projects approved last year, would amount to £A500,000 in 1959–60. Under the Act, the Federal Government contributes half the cost of drilling operations approved by the Minister as likely to yield significant new geological information to assist in the search for petroleum in Australia.

Delhi Australian Petroleum Ltd is to receive £A150,000 for drilling operations at Betoota, in South-west Queensland, about 12 miles north of the South Australia–Queensland border. Geological and geophysical surveys have indicated the presence of a large north-east/south-west anticlinal structure. It is expected that drilling will yield information on variations in the Mesozoic sequence and will penetrate a Palaeozoic sequence different from that expected to be encountered in Innamincka No. 1, which is currently drilling 150 miles south of Betoota.

Australian Paper Manufacturers Ltd are to operate at Rosedale, about 12 miles west of Sale, in Gippsland, Victoria. The proposal is to drill on a topographic crest at Snake Ridge which may coincide with a structural "high". It is expected that drilling will yield information on the position of the junction of marine and freshwater beds in the Tertiary, and may penetrate the Jurassic sediments which underlie the Tertiary. The information would also be of considerable value in interpreting the seismic and gravity data which has been collected in East Gippsland. The Company is to receive a maximum subsidy of £A48,000.

Exoil Proprietary Ltd is to receive a maximum of £A7500. Drilling will be done in two areas, first East Gambanga, about 150 miles east of Norseman, Western Australia, on the western margin of the Nullabor Plain. It is hoped to gain information about the little-known sedimentary sequence in the Eucla Basin, which consists of Tertiary, Cretaceous, and undetermined pre-Cretaceous beds.

The second area for drilling will be at Madura, about 350 miles east of Norseman, Western Australia. It is about 100 miles east of the same company's proposed site at East Gambanga. The object is also to penetrate the sedimentary sequence in the Eucla Basin, which may show significant variations at Madura as compared with what is revealed at East Gambanga.

World Tanker Statistics Second Quarter 1959

The number of oil tankers under construction throughout the world during the second quarter of 1959 totalled 300 ships of 5,076,893 gross tons, according to *Lloyds Register Shipbuilding Returns* for the quarter ended 30 June. This was 149,655 tons less than the previous quarter and represented 52·1 per cent of the total tonnage under construction in the world.

The number of steam tankers under construction was 149 of 3,596,141 gross tons, compared with the 151 motor ships of 1,480,752 tons. The tonnage of the latter actually increased compared with the first quarter of the year.

In Britain, 64 tankers of 995,688 gross tons were being built at the end of June, representing 49 per cent of the total tonnage under construction in the country, and was 96,103 tons less than in the last quarter.

Britain is again the leading country of tanker registrations with 74 vessels of 1,209,006 tons. Second place is taken by Liberia with 26 ships of 637,234 tons; and third is Norway with 33 of 513,470 tons, followed by the U.S.A. with 20 tankers of 508,274 tons. There is no change in the position of the leading tanker-owning countries. Full details can be seen in Table I.

Second to Britain in countries in which tankers are under construction is Japan, with 40 ships of 730,797 tons, followed

TABLE I

REGISTRATION OF OIL TANKERS UNDER CONSTRUCTION AT END-JUNE 1959

Country of registration	*No.*	*Gross tonnage*	*Country of build*	*No.*	*Gross tonnage*
Britain ...	74	1,209,006	Britain... ...	56	860,606
			Commonwealth	1	25,400
			Belgium ...	3	45,450
			Germany ...	2	33,200
			Italy	8	187,100
			Japan	1	30,000
			Netherlands ...	2	800
			Sweden ...	1	26,450
Canada ...	2	25,000	Commonwealth	1	24,000
			Netherlands ...	1	1,000
India	1	7,500	Japan	1	7,500
Other Commonwealth	2	1,582	Britain... ...	1	982
			Other Commonwealth	1	600
Argentina ...	1	1,600	Unspecified ...	1	1,600
Belgium ...	1	26,450	Sweden ...	1	26,450
Brazil ...	4	84,800	Japan	2	42,800
			Netherlands ...	2	42,000
Denmark ...	6	92,285	Denmark ...	5	92,000
			Germany ...	1	285
France ...	9	247,570	Denmark ...	1	18,300
			France... ...	8	229,270
West Germany	13	104,150	West Germany	13	104,150
Greece ...	1	16,300	Netherlands ...	1	16,300
Israel ...	1	13,500	West Germany	1	13,500
Italy	19	322,720	Italy	19	322,720
Japan ...	20	257,020	Japan	20	257,020
Liberia ...	26	637,234	Belgium ...	1	18,500
			France	1	45,000
			West Germany	2	51,663
			Japan	11	273,877
			Netherlands ...	2	33,200
			Sweden ...	3	68,650
			U.S.A.... ...	4	111,344
			Yugoslavia ...	1	13,500
			Unspecified ...	1	21,500
Netherlands	21	298,727	West Germany	4	2,364
			Netherlands ...	17	296,363
Norway ...	33	513,470	Britain... ...	5	90,100
			Denmark ...	2	24,500
			Netherlands ...	4	50,970
			Norway ...	12	178,360
			Sweden ...	10	169,540
Panama ...	10	199,045	France... ...	1	13,585
			West Germany	2	41,700
			Italy	4	78,760
			Japan	2	52,600
			Sweden ...	1	12,400
Peru	1	4,297	Unspecified ...	1	4,297
Poland ...	2	25,868	Poland ...	1	12,600
			Yugoslavia ...	1	13,268
Portugal ...	1	16,000	Unspecified ...	1	16,000
U.S.S.R. ...	2	6,600	Finland ...	2	6,660
Spain ...	10	120,810	Spain	10	120,810
Sweden ...	8	143,245	West Germany	1	20,900
			Sweden ...	7	122,345
Switzerland ...	1	980	West Germany	1	980
U.S.A. ...	20	508,274	Denmark ...	1	29,800
			West Germany	1	24, 00
			Sweden ...	2	76,540
			U.S.A.... ...	16	377,834
Venezuela ...	5	111,000	Britain... ...	2	44,000
			Japan	3	67,000
Yugoslavia ...	3	31,000	Yugoslavia ...	3	31,000
Unspecified ...	3	50,800	Belgium ...	1	18,500
			Yugoslavia ...	1	16,300
			Unspecified ...	1	16,000

Of the 300 oil tankers under construction, totalling 5,076,893 gross tons, 191 of 3,050,975 are for registration in country of build.

by Italy and Sweden. Table II gives details of tankers under construction, their country of build, and type of propelling machinery.

TABLE II
OIL TANKERS UNDER CONSTRUCTION AT END-JUNE 1959

Country of build	Steam		Motor		Total	
	No.	Tons gross	No.	Tons gross	No.	Tons gross
Great Britain & N. Ireland	31	723,465	33	272,223	64	995,688
Other C'w'lth Countries ...	2	49,400	1	600	3	50,000
Argentina ...	—	—	1	1,600	1	1,600
Belgium ...	2	37,000	3	45,450	5	82,450
Denmark ...	2	54,300	7	110,300	9	164,600
Finland ...	—	—	2	6,660	2	6,660
Formosa ...	1	21,500	—	—	1	21,500
France ...	6	184,270	4	103,585	10	287,855
Germany(West)	11	255,663	17	37,179	28	292,842
Greece ...	—	—	1	16,000	1	16,000
Italy	25	573,060	6	15,520	31	588,580
Japan ...	23	601,482	17	129,315	40	730,797
Netherlands ...	15	312,633	14	128,000	29	440,633
Norway ...	1	18,500	11	159,860	12	178,360
Peru	—	—	1	4,297	1	4,297
Poland ...	—	—	1	12,600	1	12,600
Portugal ...	—	—	1	16,000	1	16,000
Spain ...	1	22,000	9	98,810	10	120,810
Sweden ...	9	253,690	16	248,685	25	502,375
U.S.A. ...	20	489,178	—	—	20	489,178
Yugoslavia ...	—	—	6	74,068	6	74,068
World Total ...	149	3,596,141	151	1,480,752	300	5,076,893

During the second quarter of 1959 Britain commenced 5 tankers, launched 14, and completed 15. Japan commenced 26, launched 30, and completed 28. Germany commenced 6, launched 9, and completed 17. The U.S.A. commenced 3, launched 7, and completed 9. Details of launchings appear in Table III.

TABLE III
OIL TANKERS LAUNCHED DURING THE SECOND QUARTER 1959

Country of build	Steam		Motor		Total	
	No.	Tons gross	No.	Tons gross	No.	Tons gross
Great Britain & N. Ireland	4	77,300	10	78,860	14	156,160
Other British C'lth C'tries	1	25,400	—	—	1	25,400
Argentina ...	—	—	—	—	—	—
Belgium ...	—	—	2	32,450	2	32,450
Denmark ...	—	—	3	41,300	3	41,300
Finland ...	—	—	2	6,660	2	6,660
Formosa ...	—	—	—	—	—	—
France ...	2	40,200	1	13,585	3	53,785
Germany(West)	2	67,950	7	5,199	9	73,149
Italy	6	133,060	3	2,570	9	135,630
Japan ...	5	127,000	25	67,386	30	194,386
Netherlands ...	3	67,400	2	13,500	5	80,900
Norway ...	—	—	2	24,340	2	24,340
Portugal ...	—	—	—	—	—	—
Spain ...	—	—	1	3,800	1	3,800
Sweden ...	4	101,575	4	63,888	8	165,463
U.S.A. ...	7	156,830	—	—	7	156,830
Yugoslavia ...	—	—	—	—	—	—
World Total ...	34	796,715	62	353,538	96	1,150,253

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Around the Branches

ABADAN, BAHRAIN, ESSEX, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD, YORKSHIRE

Northern Branch

By courtesy of Professor A. C. B. Lovell and the University of Manchester, a party of 30 members of the Northern Branch visited the Jodrell Bank Experimental Station on the evening of 2 July. The visit lasted about 2½ hours and members were given an insight into some of the secrets of radio astronomy.

Yorkshire Branch

Treasure Hunt

This was held on the evening of 11 June, which turned out to be a delightful one from the point of view of the weather. Some 35 cars and crews left the starting point situated on the Otley Road out of Leeds. Two hours were allowed in which 24 articles had to be found and presented at the finishing point at The Scotts Arms, Sickling Hall. Each of the 24 objects had a points value in accordance with the difficulty of obtaining them. Many local inhabitants were amazed to see squads of irritated competitors looking in hedge bottoms for such things as a tuft of sheep's wool, a live fly, or a four-leafed clover. One bright competitor spent the whole two hours fishing in the river Wharfe in order to catch a live minnow (this carried the highest number of points). After an extremely interesting evening, the results were eventually announced, the first three places going to:—1. M. R. Nicholson, 2. A. Furness, 3. J. S. Hilton. F. Cropper expressed the thanks of all to the Social Committee for organizing this evening.

Summer Outing

On 25 June, a party of some 30 members travelled by coach to the Wilton Works of ICI Ltd. Lunch was taken at the Cleveland Tontine, and the party arrived at Wilton Castle at 2 p.m. After an introductory talk, illustrated by a scale model of the works, the party was taken on a 2-hour tour of the factory, concluding with afternoon tea in one of the restaurants. This, the first summer outing of the Branch proved most interesting and enjoyable.

The Wakefield Research Laboratories

Extensions at Hayes

It is appropriate that C. C. Wakefield & Co. Ltd should, in 1959, put into service a large extension to their research and development laboratories at Hayes, Middlesex. The year 1959 is in fact a double jubilee year for the Company—the diamond jubilee of its formation in 1899 and the golden jubilee of the adoption of "Castrol" as a trade name in 1909. These two aspects were referred to more fully in our August issue.

The need for the expansion of existing facilities by about 50 per cent was brought about by the fact that in the past decade the volume of research and development work carried out at Hayes on lubricants and similar products has more than trebled. To meet this need a new building has been erected and the older laboratories redesigned.

Unique Structure

Space limitations on the site called for special treatment. Consequently, and in order to avoid the blocking of existing roadways, and also to permit integration of the new and old buildings, the new laboratory is a two-storey structure supported on 18-foot stilts—that is, it has no ground floor. Internally much space has been saved by the use of ceiling heating instead of wall radiators and the installation of a special ventilation system where necessary.

The first floor is occupied by the production control laboratory, conference room, library, stores, and executive offices. On the second floor are to be found the organic research department, a physico-chemical laboratory, and workshops.

Production Control Laboratory

As its name implies, this laboratory is concerned mainly with the control of quality of the lubricants and other products manufactured in the works which are some 200 yards distant. Thus, speed of delivery of samples is important and an interesting vacuum conveyer system has been installed by which samples can be conveyed from works to laboratory in approximately 15 seconds.

A sample arrives in the control laboratory a few seconds after leaving the Blending Department

There is the usual run of standard equipment installed in this laboratory but there are also some quite interesting and novel pieces of apparatus. For example, Houillon kinematic viscometer tube is being adapted after several years of satisfactory use in the Company's Paris laboratories. The main features are that a determination requires not more than 0·5 ml of sample and can be carried out in about five minutes. The viscosity tubes are mounted permanently in the heating bath and can be cleaned *in situ*.

An improved Karl Fischer technique is used for determining water in transformer and similar oils. As little as 5 ppm can be determined with an accuracy of 1 ppm and successive determinations require not more than ten minutes per sample.

A corner of the organic research laboratory showing standard arrangements for desk accommodation and for control of services

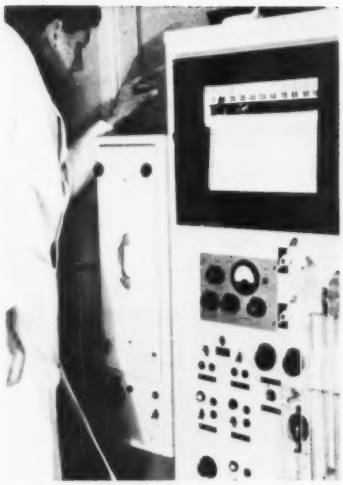
Organic Research Laboratory

A feature of this department is its division into a series of bays in each of which a team of investigators can deal with a particular project on an individual basis. Each bay has a desk for the leader, full services of gases, water, and electricity, and the benches are fitted with built-in scaffolding to avoid a miscellaneous collection of stands being required. An air trunk at the back of the bench above working level draws away fumes and a fume cupboard is also fitted.

Development Laboratory

The Development Laboratory, as its name implies, is primarily engaged in investigating the problems associated with new applications. Industry is continuously requiring just a little more from a lubricant, greater stability at very high or very low temperatures, in atmospheres of various compositions or even in the presence of radiation, to mention but a few of the many parameters. Because of the diversity of interests in this section of the Research Department, the pattern of work varies from month to month, and apparatus is constantly being devised to suit the many new test requirements introduced.

At the time of our visit work was in progress on oil additives and synthetic lubricants for gas turbines among other things.



A sample being injected into gas chromatography apparatus, an example of modern equipment at Hayes

Physico-Chemical Laboratory

Modern instrumentation is the outstanding point in this section of the laboratory, where the latest equipment for spectrographic and chromatographic determinations was observed. This equipment includes a Hilger direct reading spectrograph for visible and ultra-violet spectra. By its use the proportions of up to ten elements in an oil sample can be determined in two minutes without previous ashing. Its use for the examination of additives in lubricants and for wear studies is proving invaluable.

For testing the storage stability of viscosity-index improvers in a lubricant there is a refrigerated centrifuge which can be maintained at temperatures down to minus 30° C. It can be operated at speeds of up to 26,000 rev/min and one-pint samples can be tested at 1160 *g*.

Radiochemical Laboratory

For the testing of materials to be used under radioactive conditions, a special laboratory is provided and is so constructed that cleaning and decontamination will be easily carried out if necessary. The programme of work involves the use of tracer techniques to study the chemical action of additives on bearing metals and also the effect of irradiation on lubricants and other products.

Engine Test House

First built in 1948, the engine test house has been extended considerably in the intervening period and now houses 24 test engines comprising no less than 13 types.

This direct reading emission spectrograph automatically denotes the proportions of a predetermined number of elements in a material

Part of the well-equipped engine test house

The engines include the usual standard Caterpillar and Chevrolet engines for the L-1 and L-4 tests, and a CLR engine to carry out L-38 tests has been installed to replace the L-4 test. There is also a wide range of industrial and automotive types, both petrol and diesel, and two- and four-stroke. Thus, there are several Petter AV-1 and W-1 engines for the new IP tests when they are standardized, and a Lister 2-cylinder engine for testing marine lubricants. The latter normally has splash lubrication, but for testing purposes it has been modified so that one cylinder can be lubricated with a reference oil while the oil under test lubricates the other.

Special types or modifications of engines are available for special purposes, such as an Austin for carrying out cold sludging tests. In this engine, cold air is passed over parts of the lubrication system in order to produce the required test temperature conditions. Single-cylinder Lausons are also used for similar tests and have been found to give reproducible results. In this engine exhaust gas is passed into the sump, which is maintained below 100° F, and on a test being carried out during our visit the sump was almost full of sludge.

Another engine available for the testing of marine lubricants is a Ruston 1-cylinder diesel. The advantage of this engine is that it has separate cylinder lubrication, as do the large marine engines in practice, and this enables cylinder lubricants to be adequately examined. Research on problems associated with cylinder lubrication when using boiler fuels is under way.

An interesting group of engines for the testing of two-stroke engine oils comprises a Villiers two-stroke engine for scooters and invalid chairs, a Villiers industrial engine, and a 50-cc engine as fitted to pedal-assisted cycles.

Six beds are installed for the Lauson single-cylinder petrol engine a very useful engine for a wide variety of investigations on lubricant behaviour.

The engine test house is fully equipped with the necessary anciliary equipment. This includes a variety of dynamometers, comprising hydraulic types, electric absorption and motoring units, air brakes, and so on.

Mechanical Tests Room

This room is fully equipped with a variety of the standard wear test machines, including the SAE, the Four-ball, the Almen, and the Timken. The results of some of the work carried out here and correlated with hypoid axle tests was

recently the subject of a paper read and discussed at an Institute meeting.

Pilot Plant

During the last few years the manufacture of additives has necessitated the provision of versatile pilot plant in which the manufacture of new products or the use of new processes evolved in the laboratories can be carried out on a larger scale to give data for the design of full-scale plant.

In the main area of the pilot plant section are three stainless-steel reactors with agitators, two of 40-gallon and one of 120-gallon capacity. Both are provided with steam coils and cooling arrangements, and are fitted with automatic controls. One of the smaller reactors is adapted for gas-liquid or liquid-solid reactions.

Filter presses, heat-resistant ceramic vacuum filters, and Sharples super-centrifuges operating at up to 13,000 *g* are available for separations, and two 1500-gallon mixing pans are installed.

A glass-lined steel 40-gallon reactor with a vacuum distillation unit is used for certain manufactures and, in a flame-proof area, a 10-gallon glass-lined steel reactor with an all-glass fractionating column and ancillaries is housed. In this area there is automatic CO_2 fire protection equipment controlled by fusible plugs inside and manually from outside.

Drying ovens, and mixing and milling equipment are among the auxiliary plants available in the pilot plant section and steps are taken to minimize atmospheric pollution by effluents.

Other Laboratories

The Hayes laboratories are the headquarters of the research organization of the Wakefield group and it is here that the additives and other chemical products which are manufactured at Stanlow are formulated and developed. From the foregoing it will be seen that it ranks among the most up-to-date and best equipped laboratories of its type. There are routine and similar laboratories at Stanlow, Rotherhithe, Glasgow, and Bristol.

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Personal Notes

Sir Alexander Fleck, K.B.E., D.Sc., LL.D., F.R.S., has intimated his intention of relinquishing his position as chairman of the board of ICI Ltd and of resigning from the board of the Company on 29 February 1960.

Born in Glasgow in 1889, he started his working life as a "lab" boy at Glasgow University, later becoming a full-time student. He gained a chemistry degree at the age of 22 and by 1913 had his own research laboratory as physical chemist to the Glasgow and West of Scotland Radium Committee, and was concerned with radiological research on cancer.

The expansion of the British chemical industry during the first world war drew Sir Alexander into the Castner-Kellner Alkali Co. Ltd, which became in 1920 a subsidiary company of Brunner, Mond & Co. Ltd. The ICI merger in 1926 gave his talents wider scope, and by 1931 he had risen to be managing director of ICI's General Chemicals Division. Six years later he was appointed chairman of ICI (Fertilizer and Synthetic Products) Ltd, the predecessor of the Billingham Division of ICI.

Sir Alexander joined ICI's main board in 1944 as director responsible for the Billingham Division and also for Central Agricultural Control. From 1951 until his appointment as chairman he was one of the Company's deputy chairmen.

Sir Alexander's contributions to science as well as industry have been widely recognized, for he has received honorary degrees from many universities in the U.K.

His scientific work received further recognition when, in 1955, he was elected a Fellow of the Royal Society. A year later he was presented with the Messel Medal, the highest award to be conferred by the Society of Chemical Industry, and in 1958, he was president of the British Association for the Advancement of Science.

It will be recalled that Sir Alexander was chairman of the Advisory Committee invited in 1953 by the National Coal Board to review the organization of the coal industry. The Fleck report on that industry aroused great interest when it was published in 1955, and many of its recommendations have since been implemented. Sir Alexander received the K.B.E. in the Birthday Honours list in June of that year "for services to the Ministry of Fuel and Power". In September 1958, the Minister of Power appointed him as chairman of his Scientific Advisory Council, which was set up in 1948 to advise the Minister on the scientific aspects of his statutory duties.

The board have unanimously agreed to elect **Stanley Paul Chambers**, C.B., C.I.E., as chairman of the board, to succeed Sir Alexander Fleck.

Mr Chambers became a deputy chairman of the Company in 1952, having joined the board in 1947 and has been finance director since early in 1948.

He took a master's degree in economics at the London School of Economics, of which he is now a Governor.

His career started in the Inland Revenue Department in 1927. In 1935 he was a member of the Indian Income-Tax Inquiry Committee and later acted as Taxation Advisor to the Government of India.

Returning to the U.K. in 1940, Mr Chambers was appointed director of statistics and intelligence and assistant secretary to the Board of Inland Revenue. In 1942 he became secretary to and a member of, the Board of Inland Revenue: for this work he was created a Companion of the Bath in 1942.

At the end of war he was appointed chief of the Finance Division of the British Element of the Control Commission for Germany, which post he held until he left to join the board of ICI in 1947.

Mr Chambers is also a director of the National Provincial Bank Ltd; the Royal Insurance Company Ltd; the Liverpool, London and Globe Insurance Company Ltd; African Explosives and Chemical Industries Ltd; and several other companies, and is a part-time member of the National Coal Board.

Pictured at the decoration ceremony: (left to right) *The Lebanese Ambassador, Ibrahim al Ahdab; Lady Southwell; Mme al Ahdab; and Sir Philip Southwell*

Decoration for Sir Philip Southwell

On 22 July Sir Philip Southwell, C.B.E., M.C., until recently managing director of Kuwait Oil Company Ltd, was invested with the Lebanese Order of the Cedar by the Lebanese Ambassador in London, Sayyid Ibrahim al Ahdab.

This award was made by the President of Lebanon to Sir Philip in recognition of his distinguished services in promoting the growth of trade between Kuwait and Lebanon and the sympathetic treatment of many Lebanese nationals employed by Kuwait Oil Company. Sir Philip retired from the post of managing director of the Company, which he had held since 1946, on 30 June last.

Among those present at the ceremony at the Lebanese Embassy in London were many of Sir Philip's friends prominent in the oil industry and in Middle East affairs, the latter including Major General Sir Edward Spears and Lord Birdwood. Representatives of the Foreign Office, Kuwait Oil Company, and companies belonging to the Iraq Petroleum Company Group were also present.

Dr P. J. Garner, B.A., F.Inst.Pet., deputy laboratory manager of Thornton Research Centre of "Shell" Research Ltd, has been appointed manager of Carrington Research Laboratory, in succession to **V. N. Luke,** who has become head of the new Shell Chemical Plastics Division in London.

Dr Garner joined the Shell Group in 1943 as senior chemist of the General Research Section of the BPM Chemical Research Laboratory, which was then being set up at Thornton.

In 1946, on the formation of Thornton Research Centre, he was appointed associate director of research, later becoming assistant director in charge of research planning and co-ordination. After a period as adviser to the head of Product Development and Research Department of Shell Petroleum, Dr Garner returned to Thornton in 1955.

L. Grunberg, D.Sc., M.Sc., F.R.I.C., A.M.I.Chem.E., F.Inst.Pet., has been appointed head of the Lubrication, Wear, and Mechanical Engineering Aspects of Corrosion Division of the National Engineering Laboratory. He has been a member of the Institute for twenty years, and after graduating in oil engineering and refining from the University of Birmingham he was engaged in industrial research. For over a decade he collaborated with Dr (now Prof.) A. H. Nissan on the researches into the viscosity and molecular structure of hydrocarbons. In 1951 he joined the then Mechanical Engineering Research Laboratory of the DSIR, as a Principal Scientific Officer, to lead a research team concerned with the physical and chemical aspects of lubrication and wear. The success of his work was recognized in July 1958 by a special merit promotion to Senior Principal Scientific Officer. His present appointment, which involves a considerable widening of his sphere of interests, dates from May 1959.

Dr L. Grunberg

Universal Oil Products Company has assigned three members of its commercial development department as co-ordinators of sales and licensing activities for specific geographical areas.

C. R. McMahan will co-ordinate U.S., Canada, United Kingdom, Continental Europe, and Middle East activities.

C. R. McMahan

W. R. Sedlacek

E. W. Schnabel

Co-ordinator for Mexico, Central and South America, and Caribbean area is **E. W. Schnabel. W. R. Sedlacek** will serve as co-ordinator for Australia, Japan, and the Far East. All three co-ordinators will report to Davis Read, manager of the commercial development department.

English Electric Company announce the appointment of **Edwin C. Roberson** to its public relations staff. He was formerly with the Atomic Energy Authority, and will be responsible for press matters concerning atomic power, gas turbines, and heavy plant.

Denis A. Monk, A.M.I.Mech.E., previously manager of the Burner Department of Peabody Ltd, has been appointed general manager.

Dr Alex G. Oblad, vice-president in charge of research and development, The M. W. Kellogg Company, New York, was awarded an honorary Doctor of Science degree by Purdue University, Lafayette, Ind. in recognition of his accomplishments as a scientific director of research, author, and industrial executive.

Dr A. G. Oblad

Dr Oblad is a graduate of the University of Utah with B.S. and M.S. degrees, and received his Ph.D. at Purdue University.

From 1937 to 1942, he was a research chemist with the Standard Oil Company (Indiana) at Whiting, Ind. In the succeeding years, he has served in various administrative capacities with the Magnolia Petroleum Company, the Texas Research Foundation, and the Houdry Process Corporation, where he held the position of vice-president from 1955-57.

Holder of several patents, he has written many books and articles in such fields as thermodynamics, reaction kinetics, reaction mechanisms, petroleum chemistry, physical chemistry of solutions and related fields.

Active in many professional and honorary organizations, Dr Oblad currently is managing editor of publications of the Division of Petroleum Chemistry, American Chemical Society; and chairman, Division Officers Group, American Chemical Society.

J. Stuart Anderson, whose resignation as deputy provincial treasurer of the Province of Manitoba has just been announced, has been elected assistant to the vice president, and also assistant treasurer, of The International Nickel Company of Canada Ltd.

Mr Anderson has also been elected assistant vice president and assistant treasurer of The International Nickel Company Inc., the Company's United States subsidiary.

At their recent Congregation, the University of Durham conferred a number of honorary degrees. One of the recipients was **A. G. Grant**, M.Sc., M.I.Chem.E., M.Inst.Gas E., managing director of Whessoe Ltd, who received the degree of Doctor of Civil Law at the ceremony held at Durham on 3 July.

Mr Grant is a member of the Court of the University and chairman of the University's Appointments Bureau.

C. L. Griffin

Claude L. Griffin has been named vice president in charge of sales for Security Engineering Division, one of the Dresser industries.

Mr Griffin was previously domestic sales manager for the Company which post he has held since early in 1958. Active in the oil industry since 1933, Mr Griffin formerly was vice president of American Iron and Machine Works Company, in charge of that firm's international sales.

Laurence S. Yoxall, managing director of Foxboro-Yoxall Ltd, Redhill, Surrey, has joined the board of directors of The Foxboro Company, Foxboro, Massachusetts, U.S.A.

L. S. Yoxall

In addition, therefore, to controlling and directing the activities of the English Company, Mr Yoxall now becomes directly concerned with the operations of The Foxboro Company, U.S.A.; The Foxboro Company Ltd, Canada; the new plant being built for Foxboro (Nederland) NV, Holland; and the group's interests in Japan.

Mr Yoxall is a pre-eminent figure in Britain in the field of industrial instrumentation, particularly with reference to process control.

Price's (Bromborough) Ltd announce that **J. A Reid** has been appointed commercial director of the Company.

J. A. Reid

Mr Reid obtained an M.A. (Hons) Degree in Economics and Political Science from Edinburgh University, in 1949. He then joined Unilever Ltd and after a period of training with British Oil and Cake Mills Ltd (Scottish Branches) transferred to the British Extracting Company at Bromborough. Here he was successively, planning officer, assistant to the commercial director, and finally, in 1953, commercial manager, a post which he held until his present appointment.

Black, Sivalls & Bryson Inc have appointed **Lawton L. Laurence** as general manager of their Eastern Hemisphere oilfield operations.

Lawton Laurence

Prior to his appointment, he had been engineering vice-president of the parent company, which he joined in 1941, upon graduation from the University of Oklahoma with a B.S. in petroleum engineering. He has since served as oilfield development engineer, chief engineer of the oilfield division, and oilfield sales manager. He is particularly well known for his contributions in the field of gas dehydration and low temperature separation of oil and gas condensate. Mr Laurence will headquarter at Koninginnegracht 53, The Hague.

I. H. Gordon has been appointed assistant sales manager of Cambridge Instrument Company Ltd, at the Company's head office in London.

Mr Gordon was previously Southern Area manager of Land Pyrometers Ltd, and, prior to that, was with Evershed and Vignoles Ltd.

Third Technical Congress of European Petroleum Equipment Manufacturers

Despite the prevailing semi-tropical climatic conditions and the fact the week commencing 21 June was the "Grande Semaine de Paris" with its multifarious competitive attractions and distractions, the Third Technical Congress of the Federation of European Petroleum Equipment Manufacturers held on 22–25 June proved an outstanding success, with a record attendance of approximately 450 delegates and their wives. Of this number a mixed party of 80, including 56 delegates, came from the United Kingdom.

The key-note of the proceedings was international amity, exemplified by the general desire for the closest possible co-operation and the free exchange of technical information between the participants, nearly all of whom were senior executives of the foremost European oil companies and oil equipment manufacturers, representing some 15 different countries in all. The papers were of a satisfactorily high technical standard and promoted spirited discussion in trilingual, simultaneously interpreted, questions and answers and, by virtue of their diversity in theme, sustained a high attendance throughout the three days technical sessions.

A wide choice of social activities afforded unique opportunities for the different nationals to establish friendly relations in an environment conducive to good-will and informality.

The outstanding event of the entertainment was a banquet on a "bateau mouche" (floating restaurant cruising up and down the Seine), the careful planning and provisioning of which was only very slightly upset by a last minute influx of 75 additional un-registered guests.

With typical French tact and forethought FEPEM officials had taken considerable pains to make sure that the interests of the ladies would receive priority in the general social programme. They were taken on a sight-seeing trip around Paris, on conducted visits to the Mint, to the Houbigant perfume factory, to Royaumont and Chantilly on the outskirts of Paris, and to three fashion shows arranged by leading couturières followed by tea at the Pavillon de l'Elysée, all in addition to a series of mid-day and evening cocktail parties.

To fill in any idle time the delegates had the opportunity of visiting the Renault automobile works, two petrochemical plants, the C.F.R. Normandy refinery, two petroleum installations, and a variety of equipment manufacturers' works.

A total of 20 papers were presented at the technical sessions on three subjects as follows.

Safety in Refining Operations

"British Requirements for Electrical Equipment in Hazardous Areas" by N. C. Warshaw (Evershed and Vignoles), Great Britain.

"An Appraisal of Some Engineering Problems Associated with Safety" by J. A. Show (Esso Petroleum Co. Ltd, Fawley), Great Britain.

A film and commentary on "Static Electricity" by Dr Ir. A. Klinkenberg (BPM, The Hague).

"Maximum Temperatures of Volatile Liquids and Liquefied Gases in Tanks Exposed to Strong Solar Radiation" by Dr G. Schon (Phys. Techn., Bundesanstalt), Germany.

"Safety Features of Electrical Equipment used in the Petroleum Industry" by Dipl. Ing. Rudolf Streich (Siemens Schuckertwerke AG), Germany.

"Safety in Electrical Installations in Oil Refineries" by A. Ollive (Compagnie Française de Raffinage), France.

"New Practices in the Supply and Distribution of Electricity in Oil Refineries" by Dr Ing. H. Stolpp (Esso A.G.), Germany.

The Transport and Distribution of Petroleum Products

"Bulk Distribution of Petroleum Products by Road Lorries" by Y. Peyle (Société Française des Pétroles B.P.), France.

"Design and Construction of Tank Lorries and Aircraft Fuellers" by C. Faccio (Officine Viberti), Italy.

"Economic Considerations in the Transport and Distribution of Petroleum Products by Land and Water" by O. Sonnenkalb (B.P. Benzin und Petroleum AG), Germany.

"A Comparison of the Statutory Regulations in Force in Various Countries governing the Transportation of Liquefied Petroleum Gas by Road and Rail Vehicles" by J. Dewez (Société Belge des Gas de Pétrole), Belgium.

"French Developments in Pipeline Equipment" by Ch. Deutsch (Société Trapil), France.

"The Blending, Packaging, and Distribution of Lubricating Oils and Greases" by T. H. Craig (Shell Petroleum Co. Ltd), London.

"Considerations on Floating Plastic Blankets" by A. Champagnat (Société Française des Pétroles B.P.), France.

Drilling Techniques and Equipment

"Basic Considerations and Technical Requirements in Drilling Equipment: Problems arising from its Utilization" by G. Barthe (Société Forex), France.

"Evolution of the Turbo-drill and its Progressive Development in Applications" by B. Dagallier and G. Lagacherie (Société Neyrpic), France.

"Economic Considerations in the Use of Diamond Tools for Deep Well Drilling", by J. F. Renard (Diamant Boart), Belgium.

"The Hard Facing of Drilling Tools with Boron Carbide" by A. Montanari, Italy.

"A Comparison of VDW and API Threads for Tool-Joints and Drill Collars" by Dr Th. Altmann (A. Wirth), Germany.

"Wellhead Equipment" by Dr H. Hartl (Osterreichische Mineralolverwaltung AG), Austria.

Composite bound volumes of the complete series of these papers as presented in English, French, and German can be obtained from Monsieur J. P. Le Gall, FECEP–FEPEM, 44 bis Rue Pasquier, Paris 8e, at a cost of £4.

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ASTM Aromatics Standards Subcommittee

The ASTM are to appoint a subcommittee to establish international specifications for aromatic hydrocarbons.

The subcommittee will work through the American Standards Association with the International Standards Organization, to set up purity specifications and testing methods for benzene, toluene, xylene, and other aromatics derived from coal tar and petroleum.

Kenneth M. Brown, UOP technical service engineer, has been named by ASTM Committee D-16 to head the new subcommittee.

Mr Brown, a 21-year veteran with UOP, has been the Company's representative to ASTM's committee concerned with aromatic hydrocarbons since 1950.

Notes of the Month

SONJ Comments on Present and Future of Oil

The chairman of the board of Standard Oil Co. (New Jersey), Eugene Holman, stated, at the Company's recent annual meeting of shareholders, that although the Company fully supported the U.S. anti-trust laws, it believed strongly in the principle of free competition. By the same token, it was said, it did not believe that either the consumer or the national interest benefited by laws or regulations which deadened industrial vigour and prevented the customer from getting the value he was entitled to expect.

M. J. Rathbone, president of SONJ, also, deprecated the "tendency of governments, our own and those abroad, to exercise increasing control over business affairs".

Giving the recently imposed government controls on the importation of petroleum into the United States as an example of this, he said the government decision to control the import of heavy fuel oil was particularly unfortunate. This, widely used as a source of power in industry and for heating purposes, was, unlike crude oil and unfinished products, not competitive with domestic crude oil production.

Mr Rathbone reported that, in addition to achieving a record volume of sales in 1958, steps had been taken to improve the Company's position in developing the vast, and still largely untapped, European home heating oil market.

Mr Rathbone said that it was expected that petroleum consumption in the U.S.A. would increase by 4–5 per cent in 1959, compared with 1958, and that there would be an average annual growth of 3–4 per cent for the next several years.

Demand for oil outside the U.S.A. might, in 1959, average a gain of between 7–8 per cent over 1958, and probably 5–6 per cent a year thereafter.

After reviewing the future importance of the commercial recovery of oil from shale, Mr Rathbone pointed out the potentialities—said to be almost more impressive than those of shale oil—of the tar sands, and of those at Athabasca in particular. There it was said, the hydrocarbon-saturated sand stratum varied from a few feet to more than 200 feet in thickness, covering at least 10,000 and possibly as much as 30,000 square miles. All in all, there might be nearly 300,000 million barrels of oil awaiting the development of an economic recovery method.

This, the president said, would be enough, potentially, to supply the present crude oil needs of the world for the next half century, and of the U.S.A. and Canada for twice as long.

Return of AEO to Former Owners

Following the handing back of the properties of The Anglo-Egyptian Oilfields Ltd on 11 July 1959, responsibility for the affairs of the Company has been assumed by F. H. Frangenheim, the new managing director, who has announced that it is the intention to form a board in accordance with the new Egyptian Company Law and to hold a meeting of that board as soon as possible.

One of the purposes of this meeting will be to authorize the signature of the agreement between the Government of the United Arab Republic and the Company, which was initialled on 22 December 1958, by H.E. Dr Kaissouny, Minister of Economy, and F. S. McFadzean, representing the interests of Shell and British Petroleum.

It will be recalled that The Anglo-Egyptian Oilfields Ltd, The Shell Company of Egypt Ltd, BP (Egypt) Ltd, and Shell Chemicals Distributing Company of Egypt Ltd, were desequestrated on 21 April 1959. The subsequent period has been occupied with formalities of release, and the handing back of the properties of The Anglo-Egyptian Oilfields Ltd completes the return to the four Companies.

Burmah Oil Co. Enters U.S.A.

The Burmah Oil Company Ltd has decided to expand its area of operations to include the Western Hemisphere. For this purpose arrangements are being made for the incorporation of a wholly-owned subsidiary company in the United States to be styled The Burmah Oil Western Company.

This company will take up certain interests in oil exploration in the U.S.A. in co-operation with the Murphy Corporation of El Dorado, Arkansas.

It is also intended that this co-operation between The Burmah Oil Company and Murphy Corporation will extend to other spheres as opportunity offers.

Kuwait 1958 Operations

The Kuwait Oil Co. Ltd, in its Annual Report for 1958 to His Highness the Ruler of Kuwait, reports that there was "an active twelve months in all the Company's departments".

The major project completed during the year was the extension of the refinery to a capacity of 190,000 brl a day from its former intake of 30,000 brl daily. Projects started or continued in 1958 included a Platformer, and the building of a new hospital at Ahmadi for company personnel.

Crude oil production in 1958 was 69,117,138 tons—an increase over the previous year of nearly 13 million tons, the largest since production first began.

The Company's seismic party completed its programme in mid-June, and exploratory drilling was begun at Minagish in October, the rig having been skidded from Raudhatain—a distance of about 85 miles. The development of the Raudhatain field continued, 13 oil wells being drilled to an average depth of 8600 feet. In the Sabriya area the No. 2 well was drilled to a depth of 10,200 feet, and a total of 39 oil wells were completed in development drilling in the major producing areas—6 in the Ahmadi field, and 33 at Burgan.

The completion and commissioning of two additional oil gathering centres (bringing their total to 13), increased the number of wells connected into the production system in south-east Kuwait to 297, in comparison to 238 a year ago.

Design of the compressor plant for natural gas injection to maintain reservoir pressure has been completed, and the scheme is expected to be in operation in September 1959.

Progress continued on the 30-inch diameter crude oil pipeline from North Kuwait to Ahmadi. Completion is expected in mid-1959. In addition, three 38–40-inch gravity lines, covering the 6½-mile journey from Ahmadi north tank farm to the North Pier, were nearing completion at the end of the year. At the end of 1958 the North Pier project, which would serve the largest oil tankers, was also nearing completion.

BP Half-Year Production Statistics

Figures have been announced for the production of crude oil during the first six months of 1959 in certain areas where The British Petroleum Co. Ltd has interests.

Iran, 21,679,000 tons; the Iraqi fields of the IPC Group, 19,254,918 tons; Kuwait, 34,347,392 tons; Qatar, 3,960,850 tons; and BP fields in Britain, 39,827 tons.

Aramco Report of Operations

The 1958 *Report of Operations to the Saudi Arab Government by the Arabian American Oil Company* is, in presentation, well up to the standard of its predecessors. It tells the story of Aramco progress in the year by copious facts and excellent photographs.

Production of crude oil during 1958 rose slightly to 370,385,754 brl compared with 362,121,478 brl in the previous twelve months. This was obtained from 192 producing wells at the end of 1958, an addition of three over the year. The Ghawar field contributed 66 per cent of the 1958 production total.

Oil exploration activity during the year was again mainly concentrated on the Rub 'al-Khali (the "Empty Quarter"). Other regions in which oil search took place were the northern Summan, Central Dahna, and Gravel Plains, of north-central and north-east Saudi Arabia.

The Ain Dar gas injection plant was the largest oil facility under construction. Designed to compress and put back underground 200 million cu ft/day of gas, the plant was near completion at the year's end.

During the year under review 23 deep wells were drilled, whilst additional oil reserves located by drilling operations exceeded the amount of oil withdrawn in 1958 by about 1800 million brl. The Company's proved recoverable reserves at the end of the year were estimated at 36,700 million brl.

The first three wells at Khurais were completed, and Khurais No. 4 was drilling at 12,444 feet at the end of the year. The first exploratory well in the offshore Manifa field was completed in an entirely new productive zone, and the second well was also completed as a producer.

The delivery capacity of the Tapline system was increased from 325,000 to 450,000 bd, by the installation of a sixth diesel pumping unit and two gas turbine booster pumps at Nariyah.

The Ras Tanura refinery processed a total of 61,363,442 brl of crude oil during 1958. This was 8,943,859 brl less than in the previous year. Refinery production was 60,764,842 brl, a drop of 9,180,101 brl. This was in line with the general decline in refining activities in the major oil-producing areas of the world. A new alkylation plant, scheduled for completion in the summer of 1959 was under construction at the refinery. This will make possible the manufacture of aviation gasoline for the first time in Saudi Arabia.

New facilities were also added to the refinery in 1958 for processing and handling LPG, and provided a loading capacity of 1500 bd.

The expansion of the country's industrial activity resulted in a greater consumption of petroleum products in 1958. Aramco distributed a total of 3,203,214 brl—an increase of 167,546 brl or 5·5 per cent over 1957.

Bahrain Oil in 1958

In the year 1958 the highest level of oil production ever recorded in the state was reached by The Bahrain Petroleum Company Ltd, it is announced in the Company's 1958 *Report to the Ruler of Bahrain and Its Dependencies*. Crude output totalled 14,873,111 brl, as compared with 11,961,462 brl in the previous year. Total cumulative production to the end of 1958 was 213,443,805 brl. This increase in production after some years at a more or less constant level was made possible by an extensive programme of re-arrangement of the producing pattern and facilities.

One new well was completed in the main Bahrain field, and two field step-out wells were drilled, during the year.

An exploratory well was begun in the Buri area, and by the end of 1958 had reached a depth of 5004 feet.

A total of 70,415,036 brl of crude oil was processed at the Bahrain refinery during the year under review. This was nearly 5 per cent more than in 1957. About 48 million brl of the 1958 total was composed of Arabian crude oil.

At the end of 1958 schemes for strengthening and extending Sitra wharf were under discussion. The project will involve demolition of the Island wharf and improvement to No. 2 wharf to make easier the accommodation of large tankers. Work is expected to begin this year for completion in 1962.

One of the outstanding developments of the past year was the rapid expansion in the activities of the Local Purchasing Department. Orders were placed to the value of approximately Rs 9½ million, an increase of nearly 90 per cent over 1957.

New USBM Treatment for Waterlogged Wells

A new, inexpensive, technique has been developed by U.S. Bureau of Mines researchers for restoring productivity in natural-gas wells by removing water accumulations with foaming detergents.

The low-cost foaming technique employs chemicals like those used in household and industrial detergents, and was discovered during research on problems of storing gas in underground reservoirs.

The foaming technique has been tested successfully in selected wells that employ many different types of casing-tubing combinations—ranging from seven-inch casings to three-quarters-inch siphons, at depths varying from 650-3400 feet, and with well-head pressures as low as 20 psi. Its cost per single treatment varies from about $3 to $10, depending on the volume of water to be removed. This outlay is far less than that for siphoning systems especially built for this purpose, or the tedious and time-consuming bailing and swabbing methods that are sometimes practised.

Additional information about the foam processes can be obtained from the Bureau's Petroleum Experiment Station, Bartlesville, Okla., referring to USBM release, dated 13 April 1959, P.N. 53233.

Aerial Survey to Establish Consortium Oil Boundaries

Hunting Aerosurveys Ltd have been carrying out a survey for the Iranian Oil Exploration and Producing Company in connexion with the definition of the boundary of the Consortium's oil agreement area in Iran.

This agreement area extends three miles out into the Persian Gulf from the lowest tide-line, and the landward boundary runs over the Bakhtiari mountains up to the Iraq border. Owing to the difficult terrain, no accurate maps exist on which the boundary can be plotted nor has it been possible to define its exact position on the ground. The Iranian Government is now allocating oil exploration rights adjacent to the Consortium agreement area so that an accurate survey of the boundary line became necessary.

Huntings were awarded contracts for aerial photography of the seaward and landward boundaries, totalling 2000 miles, and ground survey work for "controlling" the photographs for mapping purposes.

For the purpose of relating the aerial photographs to points on the ground a tellurometer team assisted the oil company's ground surveyors. The tellurometer is an accurate new surveying instrument which measures distances up to 40 miles electronically.

Major Exploration Grant in Canada's NW Territories

What is believed to be the largest transaction on untested oil and gas lands ever made in Canada was announced on 30 June.

An agreement has been concluded whereby Canada Southern Petroleum Ltd has granted exploration rights over 1,224,050 acres in the Northwest Territories to Home Oil Co. Ltd, Signal Oil & Gas Co., Kern County Land Co., Alminex Ltd, and United Oil Ltd, with Home Oil as the operating company.

The properties are currently held 75 per cent by Canada Southern Petroleum, and its partners, Magellan Petroleum Corp. and Oil Investments Inc (a subsidiary of two Venezuelan concerns—Pancoastal Petroleum Co. and Pantepec Oil Co.), each holding 12½ per cent.

In return, the five companies pay initially a sum of $3½ million and conduct a five well exploratory programme. In addition they will spend a minimum additional sum of $3 million in exploration and drilling over the next five years, and will receive a 50 per cent interest in the properties.

A large portion of the properties include the North Petitot structure, which has been the subject of a great deal of oil company interest since its existence became known. Covering an area of approximately 250 square miles, it is said that its reef build-up is comparable to that which has accounted for Canada's most prolific oil-producing areas.

New Saharan Exploration Permits

Société des Pétroles de Valence, in which the BP Group has a 50 per cent interest, has received three new permits to explore for oil in the Algerian Sahara. These permits cover 1500, 100, and 200 sq km respectively. In 1958, SPV received exploration permits covering four areas totalling 16,000 square km in the Sahara. The new permits cover extensions to three of these areas.

At present the Société des Pétroles de Valence has two seismic refraction parties at work in the Sahara, one in the Oued N'sa permit area, and the other in the Hassi Menkel region.

Nigerian Oil Search

Exploration drilling activities of The Shell-BP Petroleum Development Company of Nigeria Ltd, are concentrating increasingly on the Niger Delta area.

The Company's seventh water-borne well has just been completed at Benin West, in the Western Region of Nigeria. In May last, a second water-borne rig consisting of a drilling tender with a submersible derrick barge, the first of its kind in the world, "spudded in" its first well near Bonny.

Following the introduction of this rig, and because of the continuing increase in speed with which wells are being drilled and rigs moved from one site to the next, the Company is now able to maintain its planned programme using one land rig less. As a result, one of the company's contractors will now withdraw a land rig after completion of the well at Okoloma, in the Eastern Region, where it is at present at work.

The fifth well to be drilled by Shell-BP in the Western Region has been drilled to a depth of 8691 feet. As at the previous well in this area, Benin City, the quantities of oil found were not sufficient to produce and transport economically, and the well has been abandoned.

A further well is now drilling at Ughelli, Delta Province, in the Western Region.

Deep Test Well in Libya

BP Exploration Company is to "spud in" a deep test well in Libya in mid-October. It will be the first well to be drilled in a BP concession in Cyrenaica, some 200 miles south of Tobruk and the same distance from the Egyptian frontier.

The drilling site is in the middle of a gravel plain, entirely uninhabited and remote from all other wells. Equipment capable of drilling to a depth of 12,000 feet or more will be taken by truck from Tripoli along mine-cleared tracks. Full use will be made of aircraft to supply the 22 members of the drilling team who will spend eight or nine months on the site.

BP Exploration Company has previously drilled three test wells in Libya, in which it has more than 70,000 sq km of concessions.

Saudi Arabian LPG for Export

The Arabian American Oil Company is constructing a $5,250,000 plant to make sizeable quantities of refrigerated liquefied petroleum gas available for offshore sales from its Ras Tanura terminal, on the Persian Gulf coast of Saudi Arabia. The new plant is scheduled for completion in August 1960.

The LPG plant will cool the gas to −25°F to permit its overseas shipment as a liquid in special refrigerated LPG tankers. Its capacity will be 4000 barrels per calendar day, and it will be the first in the world to make refrigerated LPG available for tanker shipment.

The new facilities will include two 80,000-barrel steel tanks for storing the refrigerated LPG at atmospheric pressure, loading pumps, and a 22-inch pipeline to carry the liquid to Ras Tanura's north pier for loading.

The LPG will be produced at Aramco's refinery at Ras Tanura by gathering propane from the polymerization plant, and both propane and butane from the alkylation plant. The sulphur and water will be removed from the LPG.

The refrigerated LPG plant will be the newest installation in Aramco's programme for utilizing and conserving gases. The leader in gas conservation in the Middle East, Aramco has constructed two of the world's largest gas-injection plants for compressing and putting back into the oil reservoirs a total of more than 400 million cubic feet of gas per day. These plants are located in the Abqaiq field and in the 'Ain Dar area of the Ghawar field, and make possible the conservation and industrial use of 66 per cent of the gas produced in association with crude oil in Saudi Arabia.

U.S. Government Helium Plant Reopened

The U.S. Bureau of Mines Navajo helium plant, at Shiprock, N. Mex., is to be reactivated, following the award of a gas-supply contract to the Pan-American Petroleum Corpn.

The Company has agreed to install an 8-mile pipeline from one of its new gas wells to provide helium-rich natural gas for processing in the Government plant. Under the contract, which will run three years, the Bureau will pay the Company 19 cents per 1000 cu ft of natural gas delivered. The gas now averages 5·8 per cent helium.

Anticipated helium output from the Navajo plant will be approximately 3½ million cu ft/month, or about one-tenth that of the combined production of the Bureau's three plants at Amarillo and Exell, Texas, and Otis, Kansas.

The Navajo plant began operating originally in 1954, and had produced 280 million cu ft of helium before it was placed in standby status.

The largest refueller in the world servicing a BEA Viscount *at London Airport*

Jet Fuelling Simulation for Test Purposes

Methods for more rapid fuelling of big jet aircraft are being developed at the Linden, N.J., laboratories of Esso Research and Engineering Co. through the use of unique test equipment that closely simulates airport conditions. Thousands of gallons of jet turbo fuel are circulated daily through a full-scale mock-up of an airport fuelling system and a jet plane's wing tanks. Information from these realistic test operations is enabling engineers to recommend types of equipment and system designs for foolproof control of the fast-flowing fuel.

As much as 20,000 gallons, or more, of fuel must be delivered to a big jet plane in a matter of minutes. This calls for high fuel-pumping rates and fuel-line pressures, and foolproof controls are necessary to avoid hydraulic pressure shocks.

Esso engineers have made a number of improvements in control techniques and have more under development. To speed their development work, they decided to supplement their extensive laboratory facilities with a unique outdoor test facility that simulates a full-scale airport fuelling operation, and is a new part of an overall Esso Research programme in techniques of jet-fuel handling.

Hydrant type systems, where the fuel is carried in underground pipes from central storage tanks to outlets at aircraft servicing sites, ensure the availability of ample, ready-to-use supplies of fuel. A turbo-fuel servicer vehicle is used to provide a connexion between hydrant outlet and the aircraft's fuel tanks. The servicer contains equipment for filtering, metering, and pressure controlling.

The facility includes two large tanks about 10 feet above ground level. Although the tanks look like regular oil storage tanks, they closely simulate jet wing tanks with underwing fuelling connexions, piping and valve systems, and interior tank compartments.

Refuelling Facilities at London Airport

Esso Petroleum Company Ltd has announced details of its new 12,000-Imperial gallon *Python* aircraft refueller for regular service at London Airport. The *Python*, which was built by Steel Barrel Co. Ltd, and designed in collaboration with Esso, is the largest refueller in the world. Its introduction has been occasioned by the increasing fuel capacity of modern aircraft, notably the large turbo-jets, and their need for rapid service.

Control panel is aft of the driving cab

The articulated unit is 55 feet long and is drawn by a long wheel-base Foden tractor powered by a Rolls-Royce diesel engine. A control compartment housing control panel, meters, and gauges is provided behind the tractor cab.

The refueller is designed to dispense 1000 gpm through two hoses and to defuel at approximately 150 gpm. The centrifugal cargo pumps, as well as all auxiliary items, including the hose reels, are driven by hydraulic motors, the installation having been designed and manufactured by Andrew Fraser. The total capacity of the tank is 12,000 Imperial gallons plus 4 per cent ullage. The tank is divided into three compartments which are inter-connected and may be used as one compartment.

Launch of "British Trust"

On 26 June, BP Tanker Company's latest 15,500-ton oil tanker was launched at Lithgow's Ltd, Port Glasgow yard. She was named *British Trust* by Dame Pattie Menzies, G.B.E., wife of the Rt Hon R. G. Menzies, Prime Minister of Australia.

Dame Pattie Menzies, G.B.E., the Rt Hon R. G. Menzies, Sir William Lithgow (chairman of Lithgow's Ltd), and Sir Neville Gass, chairman of BP, seen prior to the launching ceremony

"Esso Liverpool" Launched

Another in the series of 36,040 dwt tankers built for Esso Petroleum Company was launched on 7 June from the San Marco yard of Cantieri Riuniti dell'Adriatico, Trieste, under the name of *Esso Liverpool*.

This tanker is the latest addition to the Esso Petroleum Company's tanker fleet and is the tenth of eighteen in the current programme of tanker construction which also includes the building of seven ships of 47,400 dwt, two of which may be increased to 73,000 dwt.

The vessel is 690 feet overall in length, with a beam of 90 feet, and will have a loaded summer draft of 35½ feet. She will have a service speed of 17 knots and will be able to discharge her cargo in less than nine hours at a rate of 4350 tons/hour through four pumps.

First Deep Sea Trial of "Dracone" Flexible Vessel

The Heavy Organic Chemicals Division of ICI Ltd and Dracone Developments Ltd have successfully completed the first deep-sea trial of a *Dracone* flexible towed container.

Many of the petroleum chemicals which ICI's Heavy Organic Chemicals Division manufactures and exports in large-tonnage shipments are lighter-than-water liquids capable of transportation in *Dracone* containers—for instance, plasticizer alcohols, such as *iso*-octanol, and solvents, including acetone *iso*propyl alcohol and *iso*butyl alcohol.

The Division therefore arranged to ship a trial cargo of liquid hydrocarbons from its works at Billingham, County Durham, to Flushing in Holland.

Dracone D 4, which has a carrying capacity of 40 tons was selected for the job, and was towed by the ocean-going tug *Fiery Cross* of Middlesbrough, to Flushing. The 260-nautical mile voyage was completed in two days at an average speed of 6·8 knots.

The Tees Towing Co.—owners of *Fiery Cross*—reported that there were no serious problems and the tow-rope loading was far less than they had expected for a container of this size. The *Dracone* towed throughout in a perfectly docile manner, without yawing or snatching.

Lt-Col. H. G. Hasler, D.S.O., O.B.E., R.M. (Rtd), (operations manager of Dracone Developments Ltd) commented that the rough seas threw the tug around a good deal, but did not seem to worry the *Dracone*. All night, the acetylene light on the tailfloat of the *Dracone* shone clearly through the spray, marking her position for the benefit of other shipping.

Transportation of chemical cargoes in these containers appears, therefore, to be practicable. It should be possible for a normal cargo vessel to take the containers in tow without materially increasing fuel costs, or reducing speed or conventional payload.

The Heavy Organic Chemicals Division of ICI intends to carry out further investigations into this novel method of exporting its products in bulk.

BP Tanker Company's Expenditure

During 1958 BP Tanker Company spent £2,526,000 in the United Kingdom on ships stores, including provisions, paints, and machinery parts. In the same period purchases in foreign ports cost a further £429,000.

The biggest portion of the amount spent in the U.K. was £768,000 expended on machinery parts. Some £468,000 was spent on general stores and £357,000 on paints. Fresh provisions accounted for £293,000 and dry provisions cost £299,000. A further £332,000 was expended overseas on provisions.

Calouste Gulbenkian Foundation

The Board of Trustees of the Calouste Gulbenkian Foundation, Lisbon, recently announced this year's list of grants, which amount in all to over £½ million. Of these, the U.K. and the Commonwealth overseas receive nearly £50,000, and amongst them are the Foundation's first grants to projects in Scotland and Northern Ireland.

Grants of particular interest include those for the provision of an arts centre in Baghdad, the Aldeburgh Festival, the Sarawak Museum-Niah Caves, the National Trust for Scotland, Queen's University Belfast Youth Club, and the Mermaid Theatre.

Australian Motor Spirit Production Approaches Demand

Australia is rapidly reaching the stage at which its oil refineries will be able to manufacture the whole of the nation's needs of motor spirit.

Figures issued by the Petroleum Information Bureau (Australia) show that last year Australian refineries manufactured 983 million gallons of motor spirit—equal to 93 per cent of the 1060 million gallons consumed.

In 1957, Australian refineries' production of motor spirit was 88 per cent of consumption, and in 1956, it was only 78 per cent.

As a result of the construction of another large refinery near Adelaide and expansion of existing refineries (notably Kurnell, New South Wales, where capacity is being doubled), Australia will in a few years not only be able to refine all its needs of motor spirit but will have a sizeable surplus to export.

Karlsruhe Refinery Project

During the next few years a large refinery will be built in the Karlsruhe area of Western Germany by Esso AG. It will have a crude oil throughput of 3½–4 million tons/year and production is scheduled to commence in January 1963.

The refinery will be supplied by pipeline from the Mediterranean port of Lavera, near Marseilles. This pipeline, which is expected to be completed towards the end of 1962, will have an initial capacity of 10 millions tons/year which will be later increased to 20–30 million. The Karlsruhe plant will produce gasolines, diesel fuels, and jet fuels, as well as light, intermediate, and heavy heating oils. It will largely supply the south German market but there is a possibility of it supplying Swiss demands as well.

Nigerian Refinery Prospects

As announced earlier this year, The Shell-BP Petroleum Development Company of Nigeria Ltd has arranged for preliminary studies to be started of the economic feasibility of establishing an oil refinery in Nigeria.

In furtherance of these studies a six-man survey team paid a short visit to Nigeria in August to investigate possible locations for a refinery and other relevant factors. The team was led by J. J. Darley, manager of BP's Process Engineering department in London, and he was assisted by three experts from BP and two from Shell.

Shell Haven Refinery Capacity Doubled

A new crude distillation unit, engineered and built by Stone & Webster Engineering Ltd, has gone on stream at Shell Haven. The addition of this unit almost doubles the refinery's distilling capacity, the 80,000 bd capacity of the plant bringing total output of the refinery to approximately 160,000 bd.

Two special features of the plant, designed in collaboration with Shell technologists in Holland, are the high degree of heat recovery, resulting in about 30 per cent lower fuel consumption than in previous designs, and the good recovery of light hydrocarbons, obtained by use of a large high speed centrifugal compressor which receives all the uncondensed streams and delivers them to the gas fractioning columns.

The new unit, together with tankage and auxiliary equipment, represents an investment of about £6·5 million.

Kuwait Refinery Extension

On 3 June the new Hydrobon Platforming unit at Kuwait Oil Company's Mina al Ahmadi refinery went on stream. It is located on a site adjacent to the two crude oil distillation units which started up early in 1958 and raised the crude oil processing capacity of the refinery from 30,000 brl/day—from the original unit installed in 1949—to 190,000 brl/day.

The Hydrobon Platformer (licensed by Universal Oil Products Company) can process 4000 bsd of charge stock (a naphtha fraction prepared from straight-run gasoline derived from Kuwait crude), desulphurizing and up-grading it to produce a high-octane Platformate, which is blended with other gasolines produced in the refinery to yield a premium grade motor gasoline.

Demand for higher octane gasoline in the State of Kuwait has been rising steadily in recent years as more cars with high compression ratio engines have been imported. Hitherto, the high octane spirit needed for blending with the locally-produced gasoline had to be imported. Completion of the Platformer renders these imports unnecessary. As a result, on 16 June the price of premium grade motor gasoline sold through the Company's eleven sales filling stations in the State of Kuwait was reduced from 81 nP to 77 nP/gallon (100 nP=1s 6d approximately), to which a local tax of 3 nP per gallon is added.

Monsanto's Polyethylene Plant at Fawley

Monsanto's polyethylene plant at its new factory at Fawley, is now in production. Using a high-pressure process, it is making a range of polyethylenes at an initial rate of approximately 10,000 tons/year. Production facilities are already being expanded.

The factory, the only one of its kind in southern England, has cost some £3¼ millions to date, and is immediately adjacent to the Esso Petroleum Company refinery, from which it takes its raw material, ethylene, which is made in Esso's recently-commissioned petrochemicals plant.

Construction of the factory was started in June 1957 and commissioning began early in 1959. In addition to the manufacturing buildings there is a versatile 1/220th-scale pilot plant reactor system capable of accurately simulating full-scale working conditions. It will be used to extend the range of production by developing specialized materials, and to increase the efficiency of operations.

Union Carbide's West European Expansion

Plans for doubling Union Carbide's polyethylene production in the U.K. were announced recently. Existing facilities at Grangemouth will be augmented by another unit designed to produce 30 million pounds annually, and which it is anticipated will be in production by late 1960. Bakelite Ltd, an affiliate of Union Carbide Ltd, will distribute the output of the plant.

In addition to the initial polyethylene plant at Grangemouth, Union Carbide is constructing an ethylene oxide and derivatives plant at Fawley, which is expected to be in operation in the last quarter of this year, with a production capacity of 45 million pounds annually.

This latest expansion represents the sixth major investment by Union Carbide Corporation in the European petrochemicals field. SpA Celene, a jointly owned Italian company formed in 1957 by Union Carbide and Societa Edison, of Milan, is constructing a polyethylene unit, as well as an ethylene oxide and derivatives plant, in Sicily. Both installations are expected to be in production in 1960. In Belgium, another polyethylene plant of approximately 30 million pounds annual capacity, a joint venture of Union Carbide and the Belgian company Société Chimique des Dérives du Pétrole, SA, was announced in January of this year.

In the United Kingdom, Union Carbide Ltd already manufactures a variety of industrial products including ferro alloys and electro-metallurgical products through its Alloys Division, chemicals through its Chemicals Division, and barium getters through its Kemet Division. An affiliate of Union Carbide Ltd, British Acheson Electrodes Ltd, is a major producer of carbon and graphite electrodes, Karbate Impervious Graphite, and specially pure graphite for the Atomic Energy Authority.

PEMEX to Expand Product Facilities

It is announced that Petroleos Mexicanos will construct two new UOP Platforming units and three new UOP Unifining units. In addition, the Company has taken a major step toward satisfying needs of the Republic of Mexico for petroleum-base chemicals by the installation of a new UOP Udex unit for benzene, toluene, and xylene manufacture, and a Hydrar unit for *cyclo*hexane production.

Design and construction of these facilities will begin immediately. In conjunction with these facilities, necessary auxiliary equipment and other petrochemical producing plant for production of agricultural chemicals will be installed at Minatitlan and at other strategic locations in Mexico.

Basic engineering will be done by Universal Oil Products Company while detailed engineering and procurement will be handled by the Fluor Corporation. Petroleos Mexicanos will do the actual construction work.

Process Control at Brazilian Refinery

The American associates of Honeywell Controls Ltd have supplied a 168-ft control panel to the Mataripe oil refinery in Brazil.

The instrument panel, in 24 sections, will be the control centre for new units of the Mataripe refinery which Petroleo Brasileiro (Petrobras) is expanding from 5000 to 37,000 bd. New facilities will include two crude distillation units created by revamping thermal cracking units; atmospheric and vacuum-distillation units; catalytic cracking, propane deasphalting, and phenol solvent extraction units; and lube and wax processing units.

Standard Radiation Dose Unit

The Joint Subcommittee on Radiation Effects of ASTM Committees D-9 on Electrical Insulating Materials and ASTM Committee D-20 on Plastics, has recommended the use of the rad as a national standard unit for reporting radiation dose. The rad, which represents 100 ergs of energy absorbed per gram of material, is independent of the kind of ionizing radiation (X-ray, gamma rays, beta rays, neutrons, etc.), as well as of the type of material being irradiated. In this respect the rad differs from most other units currently in use for measuring radiation intensity and radiation effects. For example, the well-known Roentgen unit applies only to X- and gamma radiation absorbed by air.

In order to use the Roentgen as a unit for measuring exposure to radiation of materials or tissues other than air it has been found expedient to use a modified unit such as the rep (Roentgen equivalent physical). The rep was originally defined as the dose of any nuclear or ionizing radiation resulting in the absorption of 93 ergs per gram of tissue. The energy equivalent of the rep has been changed in recent years to 98 ergs per gram because of more accurate measurements.

In recommending the use of the rad as the standard radiation dose unit the committee is recognizing what was expected in 1953 by the International Commission on Radiographic Units when it adopted the rad as a new unit of absorbed radiation dose. It was expected then that the rad would eventually supersede the rep which has been widely used in reporting radiation dosage. This action of the committee to recommend a national standard unit, if widely followed, will improve communications among those reporting results of experiments on radiation effects.

Saudi Arabian Gas for Sale

The Arabian American Oil Company has announced that natural gas is available in Saudi Arabia for purchase from Aramco.

In a colour brochure entitled *Natural Gas for Sale in Saudi Arabia*, Aramco offers to "co-operate with any prospective gas purchaser" and to assist in "choosing a local plant site, taking into consideration location of gas reserves, port facilities, labour supply, water availability, and transportation."

The gases available for purchase are unprocessed gases, consisting of methane, ethane, propane, and butane as well as heavier hydrocarbons, carbon dioxide, and in most cases from 1–6 per cent hydrogen sulphide. Heating values range from 900–2600 Btu per standard cu ft.

The gases are or will be available from the 'Ain Dar, Shedgum, and 'Uthmaniyah areas of the Ghawar field and from the Safaniya, Khursaniyah, and Abqaiq fields. The total gas available this year is estimated at 163 million standard cu ft/day. The figure is expected to rise to 210 million in 1960, and to 214 million in 1961. Additional gas may become available for sale as new fields are developed or present fields expanded.

New Oil Pipeline for Assam

The British firm of Stewarts and Lloyds Ltd, have received an order to supply about 270 miles of 16-inch diameter steel pipe for use in the construction of an oil pipeline in Assam, north-east India.

The order was placed by The Burmah Oil Company Ltd, London, on behalf of Oil India Private Ltd and with the agreement of the Government of India.

The pipeline will run from the oilfields at Nahorkatiya, in Upper Assam, where substantial reserves of oil were discovered by drillers of the Assam Oil Company Ltd, a wholly-owned Burmah Oil subsidiary, in 1953, to an oil refinery to be erected near Guahati, in Assam.

This refinery, the first of two which are to be built by the Government of India, is expected to be in operation in 1961. The second refinery will be erected at Barauni, in the State of Bihar, and the oil pipeline will be extended to that plant in a later stage of the operation, making the total length of the line about 720 miles.

The new refineries will process crude oil produced in Upper Assam and transported to them by Oil India Private Ltd, a newly-formed company in which the Government of India and The Burmah Oil Company Ltd are partners.

India recently accepted credits of £3 million from the British Government for the purchase of pipe and ancillary plant for the pipeline in the U.K. Burmah Oil has offered to lend a total of £20 million to Oil India towards the sterling exchange cost of the project.

The oilfield at Nahorkatiya and the neighbouring field of Moran are capable of a production of about 2½ million tons of crude oil a year. Both fields are now shut in awaiting completion of the pipeline and refineries. At the present time the only producing oilfield in India is the small but locally important Digboi field, in Upper Assam, which was discovered in 1889.

The pipe to be supplied by Stewarts and Lloyds Ltd is worth £2 million and consists of 32,000 tons of 16-inch linepipe of API Standard 5L X46. Delivery will be made to Calcutta at the rate of four to five thousand tons a month between September 1959 and March 1960.

U.S. Carbon Black Production in 1958

U.S. carbon black production in 1958 decreased 12 per cent in Texas, 6 per cent in Louisiana, and 9 per cent for the country as a whole.

One plant in Texas shut down in 1958. However, total capacity of operating plants increased, so that at the year end it was 139,010 lb/day greater than at the close of 1957. Capacity for 41 operating plants in 1958 was 5632 thousand lb/day.

Sales for all major domestic uses declined in 1958. Sales of carbon black to rubber companies decreased by 6 per cent, and consumption of synthetic rubber, natural rubber, and reclaimed rubber decreased by 5 per cent, 10 per cent, and 7 per cent respectively.

The volume of natural gas used as raw material in producing carbon black continued to decline—from 233,788 Mcf in 1957 to 211,048 Mcf in 1958. Production of carbon black from gas was 700,692 thousand pounds. Liquid hydrocarbon feedstock also declined, from 240,413 thousand gallons in 1957 to 231,057 in 1958. Production from liquids was 943,913 thousand pounds.

Total value at plants of carbon black production was $115 million in 1958. The average value of total production 7·00 cents/pound, 0·12 cent/pound less than 1957.

Employee Suggestion Plan Pays Nearly $3 Million in 40 Years

Statistics reaching back to 1918, the year the "Coin-Your-Ideas" plan was initiated by Standard Oil Co. (New Jersey), indicate that nearly $3 million has been paid to employees in the last 40 years and that the total number of ideas accepted run to just over 104,000.

These employee suggestions have, in turn, saved the Company many millions of dollars. SONJ says, however, that the direct savings have not been nearly as important to the Company, nor the awards to the employees, as has been the heightened sense of personal participation in company progress engendered by the suggestion system.

Corrosion Engineers' Association Formed

At a luncheon given under the auspices of *The Corrosion Engineer* at the Rembrandt Hotel, London, on 29 May, H. M. Powell, technical director of Cathodic Corrosion Control Ltd, and chief electrical engineer of the Constructors John Brown organization, announced the formation of the British Association of Corrosion Engineers.

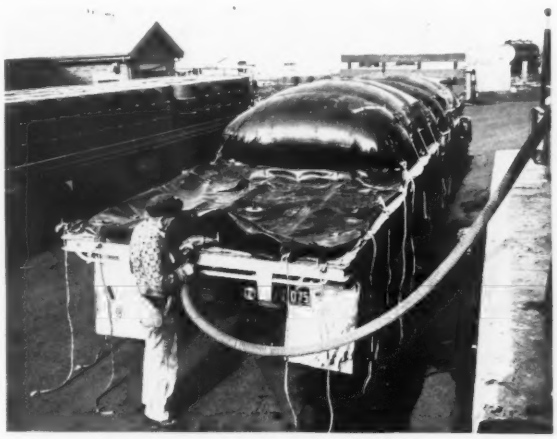
The objects of the Association will be generally to promote the dissemination of technical information about corrosion matters and to develop by means of social activities the free interchange of information among members. In due course the Association will progress towards the establishment and acceptance of suitable qualifications for corrosion engineers, and the promotion of standardization in the terminology and techniques of corrosion control.

When the Association is in full operation it is intended to hold full-scale meetings with papers, films, and discussions, which should be of great benefit to the corrosion engineering profession as a whole and which will promote and foster its growth and development as well as being of general service to industry.

Full details and membership application forms can be obtained from the Hon. Secretary, British Association of Corrosion Engineers, 97 Old Brompton Road, London, S.W.7.

Collapsible Rubber Tanks for Transportation

Collapsible rubber tanks have been used successfully by BP Australia Ltd for the transportation of up to 1200 gallons of motor spirit and other petroleum products on semi-trailer trucks. Following these trials three 1000 gallon collapsible tanks will be installed on each of the trucks of one of the Company's distributors. This will enable the distributor to back-load other goods from distant delivery points.



Although unbaffled, the tanks permit little surging while the vehicle is in motion. Drivers report that the slight surge resulting from the momentary pause as gears are changed helps the vehicles to climb hills.

CBMPE 1958-59 Report

The chairman's report for 1958–59 of the Council of British Manufacturers of Petroleum Equipment covers, in the general section, such events as last year's Chemical and Petroleum Engineering Exhibition in London (the second Exhibition being announced for June 1962), the formation of British Oil Equipments Credits Ltd and Brefcon Ltd for certain overseas equipment contracts, and the Council's work at the Tulsa Exposition and the World Petroleum Congress.

In the sphere of the Council's technical work, details are given of its representation on BSI committees, and of the 1959–60 edition of *British Petroleum Equipment*, which is now being distributed.

The membership and information service, the various committees, and the programme of forthcoming activities, are also reviewed. A final statistical and information section is devoted to some varied oil facts and figures.

BP House Extension

Arrangements are being made for BP to lease a six-storey extension to BP House, the large new office building recently occupied by part of BP's London Office staff.

This extension will be a continuation of the Ropemaker Street wing of BP House and the architectural design and treatment will be identical.

Building operations have now commenced and it is expected that the new building will be ready for occupation by mid-1960. Additional office accommodation for approximately 300 staff will be provided by this new development.

New Radiation Detector

A portable electronic "detective" has been devised by U.S. Bureau of Mines petroleum researchers to trace and record the movement of radioisotope-bearing water in underground oil reservoirs.

The lightweight, battery-powered, radiation monitor, which was designed and built at the Bureau's Petroleum Experiment Station, Bartlesville, Okla, is being used to check on the effectiveness of modern techniques for waterflooding.

Weighing less than 20 pounds complete with batteries, the monitor can be moved easily from one spot to another in an oilfield, detecting and recording the movements of water that has been "tagged" with radioisotopes before being injected underground. By recording radiation levels at different locations, the apparatus helps researchers tell how thoroughly the injected water is penetrating the oil-bearing reservoir sands.

Its cost is said to be much lower than that of heavier and more complex equipment now sold for similar purposes. It is estimated the instrument could be mass-produced for about $500–$600, compared with a retail price of at least $3000 for commercial models that are not portable.

BP International Racing Successes

Stirling Moss has written an introduction to a new booklet produced by BP, *BP International Racing Successes*, 1958. The booklet covers, in both coloured and black and white photographs, the racing successes enjoyed last season by users of BP fuels and lubricants. The description of each race is in English, French, and German.

In the introduction Moss notes that eight of the 11 events counting towards the 1958 World Championship were won on BP products, which also played their part in winning the European Rally Championships, the European Hill-Climb Championship, and more than a dozen international races.

BOBMA—Building Industry Statement on Oil-Fired Appliances

A joint statement has been made by the chairman of the British Oil Burner Manufacturers' Association and the chairman of the Merchants' Oil-Fired Appliances Committee, representing building industry distributors, British Federation of Plumbers' Merchants, National Federation of Ironmongers (wholesale section), and the Scottish Metal and Plumbers' Merchants' Federation.

It is announced that negotiations between the manufacturers' and the merchants' Associations' Committee have been successfully concluded.

At the outset of these negotiations, the merchant organizations, represented by the Oil-fired Appliances Committee, had felt that the marketing arrangements then in being for domestic oil-fired appliances did not follow any organized pattern and that little advantage was being taken of the existing facilities which the merchant trade had to offer.

Members of the public who were considering installing an oil-fired boiler had previously had little opportunity of finding a showroom where a complete range of modern oil-fired equipment could be inspected, which service could, however, be supplied by builders' merchants.

It was felt, in the interests of all concerned, and particularly in the interests of the public, that certain conditions should be established to safeguard these interests, and a section was subsequently formed by the merchants' committee to abide by these conditions.

For their part, BOBMA confirmed that the distributors and installers should abide by conditions laid down by their individual members, and accepted the standards set by the merchants' committee.

The result of these negotiations, with details of the recommendations made, are now being referred to the members of the respective associations, and on behalf of all concerned, the committees strongly recommend their acceptance, and look forward to the ultimate success of this co-operation.

Documentary Film Wins Award

A certificate of merit was presented in London, on 19 June, to the Shell Film Unit by the member airline companies of the International Air Transport Association, in appreciation of the documentary film *Song of the Clouds*, produced by the Shell Film Unit.

The presentation was made by F. C. Gillman, O.B.E., chief press and information officer of BOAC. The certificate was accepted on behalf of the Shell Film Unit by Sir Arthur Elton, who paid tribute to the co-operation of the airlines in the making of the film.

Certificates in respect of the same film were awarded also to John Armstrong, its director, and Stuart Legg, the producer.

The proposal to make *Song of the Clouds* originated at an IATA conference in 1955. The film tells the story of the operations of the international airlines in the service of mankind, and traces the story of these operations through the experiences of individual travellers. *Song of the Clouds*, which is in colour, has to date been translated into 17 languages, apart from English, and nearly 550 copies have been distributed throughout the world.

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Middle East Oil Production

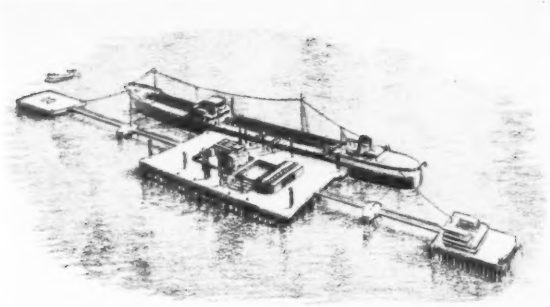
	June	*Jan-June*
	Tons	
Iraq Petroleum Co. Ltd ...	2,141,356	12,534,146
Basrah Petroleum Co. Ltd ...	1,006,578	6,083,789
Mosul Petroleum Co. Ltd ...	102,359	636,983
Qatar Petroleum Co. Ltd ...	642,999	3,960,850
Iraanse Aardolie Exploratie en Productie Mij	3,765,000	21,679,000
Kuwait Oil Co. Ltd	5,165,439	34,347,392
	Barrels	
Arabian American Oil Co. (Saudi Arabia)	32,545,361	194,347,006
Bahrain Petroleum Co. Ltd...	1,355,122	8,174,993

The refinery throughput at Abadan of the Iraanse Aardolie Raffinage Mij for June was 1,360,000 tons, the total for 1 January to 30 June being 7,510,000 tons.

Crude processed at Aramco's Ras Tanura refinery during June was 5,972,546 brl, the total for 1 January to 30 June being 32,190,354 brl.

Oil deliveries from Sidon, Lebanon, by Trans-Arabian Pipeline Co. in June were 8,545,181 brl, the total for 1 January to 30 June being 64,986,789 brl.

The Fao-Amaya Jetty



An artist's impression of the jetty

In connexion with its £25 million development programme, the Basrah Petroleum Company Ltd, a member of the Iraq Petroleum Company Group, is to construct a deep-water terminal at the head of the Arabian Gulf and about 25 miles south of Fao, its present loading port in the Shatt-al-Arab. When completed, the terminal will be capable of berthing at any time two tankers of up to 65,000 dw tons.

As the artist's impression of the structure indicates, the terminal will consist of a large centre platform carrying loading hoses and similar equipment. There will also be two smaller end sections and two intermediate mooring dolphins,

The group on the launching platfo m. Left to right: *Frank O'Connor, E. J. Hunter, Mrs O'Connor, J. E. O. Palmer*

all units being interconnected by light steel bridges. One of the end sections will take the form of a helicopter landing platform, the other being used to provide air-conditioned accommodation for about sixty personnel who will operate the terminal. They will also be used for securing mooring ropes and as a base for launches and tugs.

The two end sections have been designed initially as a single unit and were launched during July from the Wallsend shipyard of Swan, Hunter and Wigham Richardson Ltd. They are constructed on the De Long principle and on arrival at Khor al Amaya, the actual site of the terminal, will be used in the construction of the centre section of the terminal and of the two mooring dolphins. For this use, the helicopter end has a crane mounted on it and this will be removed when its use is no longer required. For the journey to the Arabian Gulf and for the construction period the two ends were fabricated as a single unit 80 feet in width and 227 feet long. When work on the central section and the dolphins is completed, they will be separated, taken to their location in the complete unit, and jacked up from the sea bed to the correct height.

The jetty will be connected to the shore by two large-diameter pipelines.

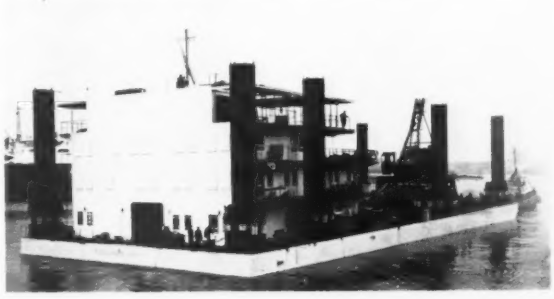
Construction of the jetty is in the hands of a joint organization formed by Raymond International (U.K.) Ltd, Richard Costain (Middle East) Ltd, and De Long (Overseas) Ltd. Consultants for the project are Rendell, Palmer, and Tritton, who have undertaken the engineering and design.

The "ship" Fao-Amaya Jetty was launched by Mrs Frank O'Connor on 21 July and is now on its way to the Arabian Gulf.

Speaking after the launch, N. M. Ekserdjian, Iraq Petroleum and Associated Companies, said that southern Iraq needed facilities for berthing large tankers and this vessel was part of a jetty to fulfil that need. The jetty project was only part of the expansion programme which the Iraq Petroleum Company and its Associated Companies had on hand. Pipeline facilities were being augmented to bring their capacity eventually up to a total of about 70 million tons per annum for Iraq as a whole.

This, he said, all meant that more money would become available for development work and increased prosperity for Iraq.

The jetty being towed from the launching



U.K. Petroleum Statistics 1958

The 1958 edition of the annual *Statistical Digest* has been produced by the Ministry of Power, giving details of production, consumption, and utilization of all types of fuel.

In the petroleum section, extracts from which are given in Table I, details of supplies are given over the last several years with in many cases figures of the countries of origin, and destination. Statistics are given of refinery throughput and output and of the consumption of products annually since 1938, and in two-monthly periods for recent years, with a breakdown according to individual products. Crude

TABLE I

	1956	1957	1958
	(*Thousands of tons*)		
Supplies of crude oil and shale oil:			
Imports of crude and process oils ...	28,608·1	27,966·9	33,928·1
Indigenous crude production ...	66·1	82·0	79·9
Indigenous shale oil	77·6	71·1	63·4
Total	28,751·8	28,120·0	34,071·4
Imports of crude and products:			
Crude and process oil	28,608·1	27,966·9	33,928·1
Aviation spirit ...	436	421	408
Motor spirit ...	1,587	1,993	1,971
Other spirit	159	276	125
Kerosine	1,391	1,490	1,129
Gas oil	1,932	2,099	1,974
Diesel oil	242	180	86
Fuel oil	3,161	3,934	4,986
Lubricating oils ...	458	396	408
Paraffin wax ...	34	34	30
Other sorts	33	41	59
Total refined products ...	9,433	10,864	11,176
Exports, re-exports, and bunkers:			
Crude and process oil	69	21	6
Aviation spirit / Motor spirit ...	1,508	1,557	2,047(*a*)
Other spirit	17	17	41
Kerosine	218	235	289
Gas oil	1,675	807	1,749
Diesel oil	462	388	489
Fuel oil	3,320	2,816	3,318
Lubricating oils ...	410	381	393
Paraffin wax ...	4	7	7
Other sorts	93	80	77
Total refined products ...	7,707	6,288	8,410
Bunkers for vessels in foreign trade and for fishing vessels...	4,436	3,476	3,806

	1956	1957	1958
	(*Thousands of tons*)		
Refining operations (*b*):			
Throughput of crude and process oils (*c*) ...	29,544	27,818	32,933
Output: (*c*)			
Aviation and motor spirits	7,215	5,908	6,751
Industrial and white spirits	253	141	144
Kerosine	859	839	1,292
Gas/diesel oils ...	5,062	5,067	6,285
Fuel oil	10,931	10,443	12,572
Lubricating oils ...	773	743	751
Bitumen	933	836	860
Butane and propane	57	72	91
Other petroleum gases	(*d*)	1	72
Paraffin wax ...	24	28	30
Miscellaneous products (*e*) ...	622	1,093	923
Total ...	26,729	25,171	29,771
Refinery fuel (*f*) ...	2,122	2,091(*g*)	2,503(*g*)
Losses and changes in unfinished stocks (*e*)	693	556	659
	1949	1957	1958
Overseas crude production by British and British-Dutch Companies (*g*):			
Middle East			
Egypt (*h*)	1,735	—	—
Iran	26,807	16,973	20,325
Iraq	2,035	9,960	17,000
Kuwait	5,730	29,037	34,471
Qatar	—	3,032	4,052
Far East and Australasia ...	6,327	10,832	10,289
India, Pakistan, and Burma	436	1,100	1,157
Europe (excl. U.K.)...	451	887	955
Caribbean and South America:			
Argentina	512	386	378
Ecuador	348	378	361
Colombia	1,090	2,143	1,853
Peru	361	546	488
Trinidad	2,880	2,733	2,812
Venezuela	23,780	51,801	42,499
Total ...	72,492	129,808	136,640

(*a*) Comprising 952 thousand tons of aviation spirit and 1095 thousand tons of motor spirit.

(*b*) 1956 figures also include those for distillation plants.

(*c*) Where oil is treated in more than one refinery, the figures include only the input into the first refinery and the output from the last refinery. The figures exclude finished products disposed of outside the industry but subsequently returned for further processing. They also exclude petroleum and coal tar products used for blending. 1957 and 1958 figures do not include distillation benzines.

(*d*) Included in miscellaneous products.

(*e*) 1957 and 1958 are estimated.

(*f*) Mainly fuel oil and refinery gases. The figures include only petroleum products made and used at the same refinery. 1957 and 1958 figures exclude amounts used in shale oil refining.

(*g*) Excluding production by British companies in North America.

(*h*) British companies' property sequestrated November 1956.

oil production by British-Dutch companies is also detailed.

There is information on the analysis of inland deliveries of gas/diesel and fuel oil by end-uses, the number of employees in petroleum and shale oil refining and in petroleum product distribution, and figures of capital expenditure on petroleum and shale oil refining.

This year the petroleum section of the *Digest* covers a greater field than previously, and a particularly interesting innovation is the details of crude oil distillation capacities of each U.K. refinery annually since 1953. Part of this section is reproduced here in Table II.

Further statistical tables introduced since the last edition give information on total product imports by sources, presenting a breakdown on this basis for each major product; exports and re-exports of crude and products by destination; a breakdown of petroleum products consumption in 1958 for Scotland, and Northern Ireland (a completely new published statistic); and the stocks of liquid fuel for burning by various manufacturing industries at two-monthly intervals.

The publication is issued by HMSO at a price of £1 17*s* 6*d* net.

TABLE II

CRUDE OIL DISTILLATION CAPACITY AT REFINERIES

Company	*Location of refinery*	1953 *thousand t*	1958 *ons a year*
The British Petroleum Co. Ltd	Pumpherston ...	180	180
	Kent	4,000	7,100
	Grangemouth...	2,500	2,200
	Llandarcy ...	4,000	3,000
Esso Petroleum Co. Ltd	Fawley ...	7,200	12,100
The Shell International Petroleum Co. Ltd ...	Heysham ...	1,765	1,867
	Shell Haven ...	3,287	3,979
	Stanlow ...	4,500	5,363
Mobil Oil Co. Ltd ...	Coryton ...	873	1,864
Berry Wiggins & Co. Ltd	Kingsnorth ...	69	150
	Weaste ...	56	90
Lobitos Oilfields Ltd ...	Ellesmere Port	115	145
Manchester Oil Refinery Ltd	Barton... ...	125	150
Wm. Briggs & Sons Ltd	Dundee (Camperdown)	37	41
Total ...		28,707	38,229

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British CIMAC Committee AGM

The British National Committee of the International Congress on Combustion Engines (CIMAC) held their Annual General Meeting in London on 31 March.

During the year under review the Committee has been active in planning and arranging British participation in the Fifth International Congress on Combustion Engines, which was held in Wiesbaden, 13–19 June. The theme of the Congress was "Diesel Engines and Gas Turbines up to 1500 hp—Current Problems Concerning Design, Production, Development, and Running at Site." Ten British papers were discussed, a higher number than ever before.

The Committee further reports that the question of CIMAC acceptance tests is still under active review by a CIMAC Technical Sub-Committee. The completion of this work has, to some extent, been delayed pending agreements on certain matters of principle within the Permanent Committee. These have centred on the status of CIMAC as a standards-making body and its consequent relationships with the International Electrotechnical Commission and the International Standards Organization. Spheres of interest among these bodies still remain to be defined. A further issue lies in the method of drawing up the CIMAC recommendations as now embodied in CR.9. The United Kingdom view is that the recommendations cannot effectively be covered in one document. Although this view is shared by at least one other National Committee, it has so far not found general acceptance among those concerned.

The British National Committee found it necessary to make one further reservation in connexion with the CIMAC recommendations, namely that if they are to have the status of an international standard the British National Committee is not the appropriate body to give United Kingdom approval. It has been pointed out that this can only be done by the British Standards Institution and that body has been informed of the position.

Hydrocarbon Oils

The amount of each class of hydrocarbon oils retained for home consumption, and the net amount received in respect of duty thereon, during the year ended 31 March 1959, was given by the Economic Secretary to the Treasury on 20 July. Details are given in the following table:

Class	*Quantity*	*Receipts of Duty*
	gallons	£
Oils chargeable with Customs duty		
Light oils:	2,190,045,736	273,778,739*
of which motor (incl. aviation spirit)	(2,140,523,206)	(267,559,121)
Heavy oils:		
For use as road fuel ...	538,168,300	67,271,514
Other (mainly lubricating oils)	175,680,122	732,001
Oils chargeable with Excise duty		
Light oils:	116,893,067	7,314,009
of which motor (incl. aviation spirit)	(61,889,948)	(3,869,628)
Heavy oils for use as road fuel	22,489,768	1,405,611
Total ...		350,501,964
Allowance on certain home-produced oils used in approved refineries as raw material for chemical synthesis		4,428,996
Net total ...		346,072,968

* Includes £30,654 in respect of light oils contained in composite goods on which oil duty was charged at a flat rate under the Composite Goods Orders, 1957, and 1958, and for which information as to the quantity of oil is not available.

These particulars relate to oil subject to a net liability to Customs or Excise duty: comparable figures are not available in respect of heavy oils for which the duty is wholly rebated.

Books and Films

Four Secondary Oil Recovery Projects in Oklahoma

Four petroleum waterflooding projects in Washington and Nowata counties, Oklahoma, each representing new or unusual techniques of applying this secondary oil-recovery method, are described in a U.S. Bureau of Mines publication released in May.

At one project described, carbon dioxide is injected into the oil-bearing formation along with water on the theory that carbonated water will flood more effectively. Another operation uses electric submersible pumps on each oil-producing well and also practises automatic custody transfer, in which the system, including delivery of produced oil to a pipeline, functions automatically.

At a third waterflood project, which employs mostly fresh water, use also is made of brine produced with the oil. This brine is injected, after treatment, into a separate part of the same project. The fourth flood features an unusual system for conditioning the water used in flooding.

Several tables, maps, and other illustrations help describe the four projects. A copy of Information Circular 7896, can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Avenue, Pittsburgh 13, Pa. Requests for this publication should mention its number and title.

Report on USBM's Gas-Purification Process

Basic information on an improved method developed by the U.S. Bureau of Mines for removing unwanted carbon dioxide from synthesis gas, is presented in a new publication released by the Department of the Interior.

Called a "hot-carbonate" process, the new technique was recently patented by the Interior Department, and is now being used by several industrial firms in the U.S.A. under royalty-free, non-exclusive licence from the Government. The publication, Report of Investigations 5484, "Equilibrium Study of the System Potassium Carbonate, Potassium Bicarbonate, Carbon Dioxide and Water," can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Avenue, Pittsburgh 13, Pa. Requests for the report should specify its number and title.

Stamps and the Oil Industry

The Petroleum Information Bureau's memoranda, which explain for the layman almost every facet of the petroleum industry, are quite well-known in many circles.

Another facet of the PIB's work is its information service on the philatelic side of the industry. About ten years ago a collection of stamps depicting oil activities was begun and exhibition panels were organized for loan to stamp clubs, etc. In addition, film-strips were made on the subject in black and white (coloured film-strips of stamps being illegal) for loan purposes, and a memorandum entitled *The Philatelic Story of Oil* was published.

Now PIB have added to this with their recent pamphlet, *The Philatelic Story of Flight*. With the aid of photographs of some of the historic stamps, a stage by stage illustration of the development of flying is presented, from Leonardo da Vinci's flying machine to the jet aircraft. Examples are also depicted of some of the historic oil stamps.

Waterflooding in 50-Year-Old Oklahoma Field

The productive life of the principal oil-bearing formation in Oklahoma's Muskogee oilfield, which has yielded crude petroleum for half a century, might be extended considerably with carefully-engineered waterflooding projects, claims the U.S. Bureau of Mines.

In a recently published technical report of the results of a recent petroleum-engineering study, the Bureau estimated that more than half of the Dutcher sands, underlying some 4400 acres of the Muskogee field, may respond favourably to waterflooding.

The Muskogee field, in Muskogee County, is one of Oklahoma's oldest oil-producing areas. Commercial output dates back to 1904. More than 90 per cent of the 9½-million-barrel total output has come from the Dutcher sands. Much of the field was abandoned at one time or another during periods of low crude-oil prices, but some of the deserted areas were later redrilled and are still producing.

Besides reviewing the history of the Muskogee field, the report discusses the geology of the area and describes in detail the production methods employed, and results obtained, in the various oil-bearing formations. Areas considered most favourable for waterflood development are discussed in the text and pictured in several maps.

Copies of Report of Investigations 5448, *Petroleum-Engineering Study of Muskogee Oilfield, Muskogee County, Okla.*, can be obtained only from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for 55 cents each. This report is not for sale by the Bureau of Mines.

Directory of Occupational Safety and Health Institutions

The International Labour Office, Geneva, have published two monumental volumes entitled *International Directory of Institutions Engaged in Study Research and other Activities in the Field of Occupational Safety and Health*. These have been published in response to widespread requests, in order to make the work of such institutions more widely known, to facilitate the exchange of information, and encourage co-operation between them.

Only national institutions are included, being listed alphabetically through the two volumes and details of their respective publications are listed. Organizations listed as active in the petroleum field are the Institute of Petroleum, the Office of Health and Safety of the U.S. Bureau of Mines, and the Brazilian Accident Prevention Association.

"Oil Man"

The latest of the "Men of Action" series of books for children, written by Eric Leyland, is entitled *Oil Man*, and published by Edmund Ward Ltd at 8*s* 6*d*.

The book gives a vivid picture of the many types of work connected with the oil industry from search to sales. A chapter entitled "Buried Treasure" describes exploration procedures, and "Sheep and Goats" is not the account of grass control measures at Kent refinery, but the intriguing title of a good basic explanation of distillation.

Written in an easily assimilated story-book style the book should be ideal for the younger type of school child and might even gain potential recruits for the industry.

Heat and Corrosion-Resisting Materials

The section concerned with literature on heat- and corrosion-resisting materials forms an interesting feature of the June issue of *The Nickel Bulletin*, a monthly summary of recent technical literature published by the Mond Nickel Co. Of the ninety abstracts contained in the issue, just under a half appear in this section. Ten of these items direct attention to work on the welding and brazing of nickel-containing materials and provide a good illustration of the intensive and fundamental research in progress in these fields. Other abstracts in the section refer to development work on heat- and corrosion-resisting alloys and steels and to evaluation of the properties of those commercially available. Three papers of particular interest report work in the sub-zero properties of cast and wrought nickel-containing steels.

Van Nostrand Oil Publications

The D. Van Nostrand Company Ltd have just published the fourth edition of *American Petroleum Refining*, by Dr H. S. Bell. The subject is presented so as to enable those in other branches of the oil industry to gain a good insight into the refining division of the industry, as well as to interest students of petroleum technology. The publishers have in preparation a leaflet which describes this and other publications of interest to the oil industry.

In addition, the Company has now produced the 1959-60 catalogue of all its books and journals and this is available from 358 Kensington High Street, London, W.14.

Russian-English Technical Publications

An extensive programme of production of Russian-English technical and scientific dictionaries and glossaries is planned by Pergamon Press, 4 & 5 Fitzroy Square, London, W.1. The programme will include publications on automation, aviation, geology, metallurgy, radio engineering, and electronics.

Classified word lists will be issued at later intervals which will keep up-to-date a new general Russian-English scientific and technical dictionary now being prepared. A similar Chinese-English dictionary is also planned.

OEEC 1958 Oil Statistics

Production of crude and shale oil in the OEEC area in 1958 totalled over 13 million metric tons. Natural gas output reached a level of 7500 million cu metres. These, and other more detailed figures, are present in the *Oil Statistics for* 1958 published by the OEEC.

A country-by-country breakdown is given of OEEC area oil and natural gas production, imports, refinery throughput; and of the supply and disposal of finished products with an itemized breakdown for the major categories.

The statistics by sectors of end use for 1958 are due to be released separately at a later date.

"Monitor"

Monitor, the oil and gas abstract magazine, has been sold by Dresser Industries Inc to Petroleum Publishers Inc, of Denver, Colorado.

The Denver firm, which publishes several local oil and mining publications, is changing the name of *Monitor* to *World-Wide Oil & Gas Abstracts*.

NBS "Journal of Research"

The National Bureau of Standards is now publishing its *Journal of Research* in four separate sections, corresponding to subject matter fields, which may be subscribed for individually. This is being done in an effort to meet more effectively the specialized needs of today's technologists.

The sections are available as follows:—

Section A. Physics and Chemistry. (Annual subscription $4; 75 cents addition for foreign mailing).
Section B. Mathematics and Mathematical Physics. ($2.25; 50 cents additional).
Section C. Engineering and Instrumentation. ($2.25; 50 cents additional).
Section D. Radio Propagation. ($4; 75 cents additional).

Publications should be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Fire Protection Publications

The Fire Protection Association has published a revised edition of its booklet *Industrial Solvents and Flammable Liquids*, which first appeared in 1954. Intended primarily as a work of reference, the booklet is set out in tabular form and provides information on the physical properties of some 400 liquids—under the headings of: flashpoint, specific gravity, solubility in water, flammability limits, auto-ignition temperature, susceptibility to spontaneous heating, vapour density, melting point, boiling point, vapour pressure, and suitable extinguishing agent.

The information on flash points and flammability limits has been extensively revised, while the alternative names of some liquids are now incorporated in the main table. The edition also contains a temperature conversion table which many will find useful.

A second publication of interest from the same source is the summer issue of the *Fire Protection Bulletin*. Articles included in the issue discuss the advantages and disadvantages of varying methods of ventilation in relation to fire; the safe disposal of waste flammable liquids; and, in particular, the subject of fire hazards connected with the fuelling and maintenance of aircraft.

Copies of each of these publications are obtainable from the Fire Protection Association, 31-45 Gresham Street, London, E.C.2. Prices to non-members are 3*s* for *Industrial Solvents and Flammable Liquids*, and 1*s* 6*d* for the *Bulletin*.

Britain, the Commonwealth, and the Common Market

Britain in Europe Ltd, which was formed in the last twelve months to carry out educational activities in the industrial field, to act as a body in which the viewpoints of all sides of industry can be represented, and to sponsor further research projects, is engaged on an important survey on the relationship of the British Commonwealth to the new European market structure.

Over a year ago the Economist Intelligence Unit prepared a review of the new challenge to British industry, entitled *Britain and Europe*. Work on the new survey, for which funds are still required from the industries of the Commonwealth, has already begun so as to avoid delay. Under the heading *The Commonwealth and Europe: A Study of Economic Relationships*, the publication will gauge future Commonwealth trade as a basis for reviewing the scope for British participation in European economic integration on terms advantageous to the entire Commonwealth.

PETROLEUM IN PARLIAMENT

Gas From Oil Refineries

The Parliamentary Secretary to the Ministry of Power refused at Question Time on 8 June to give a general direction to the gas boards to limit the amount of gas accepted from oil refineries. In reply to a statement that the supplies obtained from the two refineries in the south of England from which the gas industry would take tail gas would displace 200,000 tons of deep-mined coal, it was said that the gas industry had to get the cheapest possible supplies and that it was not in the country's interest that tail gas should go to waste.

Co-ordination of Fuel Industries

In reply to questions on 15 and 22 June asking whether the Minister of Power would set up a national fuel advisory organization composed of representatives of each of the fuel and power industries with a view to co-ordinating these industries, the Paymaster-General replied that the Minister had had meetings with all the leading figures in those industries, but stressed that the country's fuel policy should continue to be based on free competition.

Gas Supplies

In answer to a question on the subject, the Paymaster General said, on 15 June, that the increase in gas supplies expected between 1960 and 1965 was nearly 5 per cent. As it was expected that coal consumption by the industry would fall slightly during the period, the whole of the increase would be derived from oil and other sources.

Diesel Fuel Additive

In answer to a written question on 17 June the Parliamentary Secretary to the Ministry of Works replied that the DSIR knew that a diesel fuel additive which was claimed to reduce the abnoxious odours from diesel fumes had been marketed by an oil company. It had not yet been examined by the DSIR. It had received no information to the effect that a Yorkshire firm had invented a filter for extracting carbon sludge from diesel exhaust fumes, which cost £10. Results of experimental work on diesel engine exhausts carried out by the Motor Industry Research Association and the British Internal Combustion Engine Research Association had shown that most of the smoke from such engines could be substantially reduced by proper readjustment, running, and maintenance.

Electricity Generating Stations

The Paymaster-General, on 22 June, gave a written answer that ten electricity generating stations had dual-firing equipment on some or all of their boilers, and that no further conversions were planned in conventional stations.

On 6 July the Minister said that in the first 24 weeks of this year these stations consumed oil equivalent to approximately 2·7 million tons of coal.

The Paymaster-General was asked on the same day, in view of the "heavy drain" which the cost of fuel oil imports made on the national reserves of foreign exchange, what general direction he intended to give to the Central Electricity Generating Board to reduce the present consumption of fuel oil.

The Minister replied that the oil industry had to be viewed as a whole. The cost paid for importing oil was small compared with the enormous gains of foreign exchange made by the international oil companies.

Production of Oil from Coal

The quantities of light hydrocarbon oils derived from high-temperature carbonization and tar distillation in 1958 were the subject of a written answer by the Parliamentary Secretary to the Ministry of Power on 29 June.

The amounts produced were given as follows:

	million gallons
Motor benzole	42·8
Refined benzol	34·7
Toluole	8·5
Xylole	4·2
Naphthas	10·4
Total	100·6

In addition, it was said, approximately 4·0 million gallons of refined hydrocarbon oils were obtained from low-temperature carbonization processes, and 93 million gallons of creosote oil and 899,000 tons of creosote-pitch mixture were derived from coal.

Coal-Oil Conversion

The Paymaster-General said in an oral answer on 6 July that in the first 21 weeks of 1959 the large industrial consumers required to make fuel returns used 1610 thousand tons less coal and 330 thousand tons more fuel oil than a year ago. Conversions from coal to oil among these consumers were fewer in number and smaller in volume of fuel usage in the first three months of this year than a year ago.

Oil Operations in Oman

The Parliamentary Secretary to the Ministry of Power, on 16 July, refused the request of P. Noel-Baker (Derby, South), for a Command Paper containing the information furnished to the Government about the oil drilling operations conducted by a British company in Oman in 1956–59.

Atmospheric Pollution

The Parliamentary Secretary to the Ministry of Works was asked on 14 July what investigations had been made by the Fuel Research Station of the DSIR into the efficacy of "the catalyst device or muffler, brought from the U.S.A., for decontaminating and decolourizing asphyxiating and noxious fumes from the exhausts of diesel oil powered vehicles".

The Secretary replied that the Warren Spring Laboratory, which had only learnt of such a device on 25 June, was endeavouring to obtain particulars of it, prior to obtaining it if it was found to warrant it.

It was also said that the Warren Spring Laboratory, which had already carried out work on methods and apparatus for reducing the atmospheric pollution from petrol engines, had now begun experimental work on the use of catalytic afterburners for the treatment of exhaust fumes from diesel-engined motor vehicles.

Lectures, Courses, and Conferences

ISA Meetings in 1960

Among the meetings scheduled for the 1960 programme of the Instrument Society of America is the Third National Chemical and Petroleum Instrumentation Symposium to be held at Rochester, N.Y., on 5–7 April.

Other events on the programme for 1960 are the ISA Instrument-Automation Conference and Exhibit at Houston, Texas, on 1–5 February; a similar event to be held at San Francisco on 9–13 May; and a further event of its kind for New York City on 26–30 September, in conjunction with the 15th Annual Meeting.

For further details concerning the Rochester Symposium, contact should be made with the Director of Technical and Educational Services, Instrument Society of America, 313 Sixth Avenue, Pittsburgh 22, Pa. For information on the other events mentioned, requests should be sent to William H. Kushnick, Executive Director, at the same address.

The Institute of Physics

At the Annual General Meeting of The Institute of Physics, held in London on 7 July 1959, Sir George Thomson was re-elected president.

Dr J. M. A. Lenihan was elected a vice-president; Dr J. Taylor, honorary treasurer, and Professor F. A. Vick, honorary secretary, were re-elected. The two new ordinary members of the board elected were Dr V. E. Cosslett and L. Rotherham.

The Report for 1958 shows that at the end of the year the total membership in all grades was 6309—an increase of 415 on the previous year. 851 applications for election or transfer to the various grades were considered, which was 7 per cent more than the previous year.

At the end of the year a circular was sent to members proposing the amalgamation of the Institute and The Physical Society, and saying that if the broad basis of intention was accepted a joint committee would be set up to work out all the details. A scheme for amalgamation is about to be submitted to members of both bodies.

Compressed Air and Hydraulics

As a result of the present ever-increasing developments and interest in pneumatics, hydraulics, and related fluid power controls a First International Compressed Air and Hydraulics Exhibition is to be staged at the Empire Hall, Olympia, London, on 25-29 April 1960.

It will be presented in conjunction with the Second European Fluid Power Conference, the first of which was held in London in May 1958.

The sponsors of the joint event are the journal *Compressed Air and Hydraulics*, St Richard's House, Eversholt Street, London, N.W.1.

International Automation Exposition Postponed

The Fifth International Automation Exposition and Congress scheduled for the New York Trade Show Building, 16–20 November 1959, has been postponed.

Trade Literature, etc.

Rubber-Lined Fume Stack

A rubber-lined fume-stack serving ICI's new "Kaynitro" plant at Billingham has been lined throughout with a 3/16-inch rubber lining by the Dexine Rubber Co., a member of the Plant Lining Group of the Federation of British Rubber and Allied Manufacturers. Four sections have already been erected, and six more sections will be added to make a total height of 250 feet.

The stack carries away dust and vapours from the plant's rotary driers and coolers, and the rubber lining will give protection against corrosion by chlorides and sulphates at temperatures up to about 60°C. Spray towers for de-dusting gases in the same plant will also be rubber lined.

Keelavite—Rotac Agreement

Keelavite Hydraulics Ltd have concluded an agreement to manufacture and sell in Europe and the U.K. the rotary torque actuator (ROTAC) units of the EX-CELL-O Corporation of America.

The first series to be made in Britain will be the RN series. These are single and double-vane units, fitted with needle roller bearings. The range provides torque ratings from 1500 in/lb to 9200 in/lb at 1000 psi

The range of Keelavite/Rotac units manufactured in Britain will be gradually extended. Meanwhile, to meet special requirements, Keelavite are willing to import from the U.S.A. any unit not in the range at present manufactured by them.

Heating Equipment Catalogues

The Stabilag Company Ltd, of Mark Road, Hemel Hempstead, Herts, has recently revised all its technical literature, which is now freely available upon request.

The Stabilag range of heating equipment covers many industries, ranging from electrically-jacketed heating vessels for the research laboratory, to the manufacture of large-scale plant installations for fractionation and distillation purposes, etc.

The literature available includes detailed and informative leaflets on laboratory heating equipment, industrial heating equipment, and heating tape.

Four-Figure Digital Voltmeter

The Solartron Digital Voltmeter, Type LM 902 has been designed to fulfil the urgent need for a fool-proof monitoring of physical quantities converted electronically into voltages to four figures. Manufactured by the Solartron Electronic Group Ltd, Thames Ditton, Surrey, it is the logical development of the now popular three-digit voltmeter, Type LM 901, and is also a transistorized instrument of lightweight, robust construction.

Dial readings over a range from zero to four figures are impossible to achieve, except by approximation by skilled operators on even the largest of dials or standard recording charts.

The Solartron LM 902 completely eliminates all the error factors of conventional meters and is of the utmost importance in such applications as production testing, the monitoring of dynamic process experiments, process control, and the permanent monitoring of system and instrumentation elements.

Collective Representation of U.S. Equipment Firms

The recent formation of Premaberg (Great Britain) Ltd, Miter House, 117 Regent Street, London, W.1., is an example of an innovation in the U.K. petroleum equipment field; that of collective representation by manufacturing and selling of the product of many different foreign companies by a British-based concern.

The Company, itself part of a U.S. group with centres in many of the major cities of Europe, represents such U.S. firms as George W. Dahl, Daniel Orifice Fittings Co., The Ducon Company, Thermon Manufacturing Co., and Oceco Division of Johnston & Jennings Co.

One of the products now manufactured and sold by the British company is *Thermon* a heat-conducting cement to ensure maximum heat transfer from heating media to process fluid and superseding complete steam jacketing of valves, pumps, tanks, etc.

New Fuel Tanks at London Airport

The accompanying photograph shows a Neal 25-ton truck-mounted crane positioning fuel tanks for the engine test base on the new BEA engineering maintenance site at London Airport. The crane is one of the items of such equipment manufactured by R. H. Neal & Co. Ltd, Plant House, Ealing, London, W.5.

Cast Steel Pipe Line Valves

The new Triangle through-conduit pipeline valve in cast carbon steel announced by Triangle Valve Co. Ltd, 315 Regent Street, London, W.1, is designed to meet the need for a valve with smooth, clear passage, to allow for use of "go-devils" yet with a positive shut-off in the rugged conditions of pipeline service. Where required, valves can be changed from manual to motor operation very simply, since a flange with dimensions equivalent to standard actuators or bevel gears has been incorporated in larger sizes.

Relays for Liquid Level Measurement

Five different types of constant differential relay made by Sunvic Controls Ltd, Harlow, Essex, are now available with built-in variable area flow motor (Rotameter) and needle valve. These relays can be used to ensure a constant bubbling rate of purging air or gas in air reaction systems for liquid level measurement.

Highly precise flow control of the purge medium is necessary if measurement accuracy is not to be affected by variations in bubble size or by variable kinetic heads across the dip tube. Sunvic model 62A and 63A series relays meet this requirement.

No liquid whatsoever is used in the purge flow controller and so no maintenance is required. Instead of visual indications of purge rate by bubbling, an accurate flow meter, with easily-read calibrations is provided. The unit is rated at 50 psi static pressure and tested at 100 psi static pressure.

Improved Model Spray Gun

The Bullows-Binks Model 19 spray gun, now announced, has been the subject of considerable development work on the problem of the drop of pressure caused by skin friction to the passage of air compressed to 60-80 psi through a spray gun.

The result of the study has been that modification to the air passages have been made and have produced a substantial improvement in performance at high speeds.

Details are obtainable from Alfred Bullows and Sons Ltd, Long Street, Walsall, Staffs.

Fire Retardant Coating

A new brochure has been produced concerning their *Albi-"R"* fire retardant coating by Albi-Willesden Ltd, 6 De Vere Gardens, London, W.8.

The coating can be applied to any combustible building material and is supplied in powder form. Surfaces treated with *Albi-"R"* at the recommended rates of application will conform to Class 1 "Surface Spread of Flame" of BS 476 : 1953. This is confirmed in Report No. 231 issued by the DSIR and Fire Officers' Committee Joint Fire Research Organization, a copy of which is available on request.

Measurement of Strontium-90

A new all-British method for measuring the natural strontium in samples of various substances is announced by Hilger and Watts Ltd, 98 St Pancras Way, Camden Road, London, N.W.1.

The new method involves a recently-developed atomic absorption technique which is said to differ from the normal flame spectrometry method by avoiding the most serious defect of that method, which is interference from other elements in the sample. In the new technique the atoms do not have to be "excited" in a flame but are detected in their normal unexcited condition.

Joint Anglo-U.S. Company Formed

G. & J. Weir Ltd, Glasgow, and Chicago Bridge & Iron Company of Chicago, announce that they are setting up a jointly-owned subsidiary company in the United States to be known as Weir-Chicago Bridge Inc. The new company will have as its objective the design, fabrication, and erection of saline water conversion plants. The Company will be combining the knowledge and experience of G. & J. Weir Ltd, the world leader in the manufacture of large sea water evaporation and distillation plants, with the fabrication and construction facilities of Chicago Bridge, the leading builders of large evaporators for the pulp and chemical industries of the United States.

Oil, Hydraulic, and other Fluid Valves

Black Automatic Controls, Leafield, Corsham, Wiltshire, have been engaged for the past two years in finalizing the development of complete new ranges of products.

The first result of this is a greatly-extended range of solenoid and diaphragm-operated valves, developed particularly for handling fuel oils. This range is described and illustrated in the Company's Data Sheet LO, Issue 3, which can be obtained on application.

World-Wide Guide to Equipment and Technical Services

The 1959 edition of Dresser Industries *World-Wide Guide to Dresser Equipment and Technical Services* has just been published and is being distributed to executives in the oil, gas, chemical, electronic, and general industries. The colourful 68-page book is profusely illustrated and provides reference to the many products and services supplied by the Dresser group of companies throughout the world. Convenient lists of Dresser representatives and their addresses in various countries are also included.

Copies of this *Guide* may be obtained, without obligation, by writing to any of the Dresser companies or to Dresser Industries, Inc, Republic National Bank Building, Box 718, Dallas 21, Texas. Dresser (Great Britain) Ltd, is located at 197 Knightsbridge, S.W.7.

Anti-Corrosive Coatings

Arthur Holden & Sons Ltd, Bordesley Green Road, Birmingham 9, now announce their newest *Epinamel R.L.* and *Epinamel L.F.* Systems which signify a further step in the development progress of their anti-corrosive coatings.

The coatings are aimed at increased protection of tankers from the corrosive action to their plates of sea and fresh water, the impurities in black and white oil cargoes and similar problems arising from the carrying of food or drink cargoes such as grain or molasses, etc.

The new four coat systems are applied and cured in a similar manner to the standard *Epinamel A.C.* protective coating.

"Processing Equipment for the Electrical Industries"

The Incandescent Heat Co. Ltd, Cornwall Road, Smethwick, Birmingham, have issued a Controlled Heat and Air Bulletin No. 12, entitled *Processing Equipment for the Electrical Industries*. It includes details of equipment for such operations as coreplate and lamination varnishing; transformer drying and spraying; continuous varnish impregnation; bitumen coating; and battery plate drying.

Vibration Damper for Compressed Gases

The Venturi vibration damper, developed by the Chemical Engineering Division of W. C. Holmes & Co. Ltd, P.O. Box No. B7, Turnbridge, Huddersfield (Patent Application No. 9071/57), has been designed to eliminate vibrations in compressed gases due to pressure fluctuations produced by reciprocating or lobe-type compressors.

The theory on which it is based is that the pressure fluctuations are high velocity movements in the gas, and by bringing the whole of the gas up to or approaching the velocity of the pressure fluctuations, and subsequently reducing the velocity again, some or all of the fluctuations are eliminated.

The particular advantage of using a venturi for this purpose is that the kinetic energy of the gas can be recovered almost completely, thus reducing the pressure loss which would otherwise be involved.

Small-Size UOP Penex Unit

It is reported that the South Hampton, Texas, refinery, is successfully operating the first small-size commercial UOP Penex unit. Designed to process 255 bsd this unit is extremely small in comparison to earlier UOP Penex installations, and is operating efficiently. Licensed by UOP, the South Hampton unit is converting low octane normal pentane into *iso*pentane for sale as a blending component, and is operating in conjunction with a previously-installed UOP Platforming unit. Construction and operating economies were brought about by using the Platformer's high pressure separator, gas recycle, and cooler for the Penex unit as well as for the Platformer.

Tecalemit Automatic Lubrication

Tecalemit Ltd, Plymouth, Devon, announce that, as a result of close liaison with the British Motor Corporation Ltd, their new mileage-controlled automatic chassis lubrication system is now offered for fitment to British Motor Corporation commercial vehicles. It is available for all vehicles ranging from one to seven ton capacity, and can be fitted to new as well as existing vehicles by Austin and Morris commercial distributors and dealers.

Some of the advantages said to be obtained by fitting the A.C.L. system are—regular lubrication is ensured, a reduction in servicing time, minimum bearing wear, and decreased driving fatigue.

New Air Filter Regulator

The new No. 77 Mason Neilan air filter regulator set from Crosby Valve and Engineering Co. Ltd, Crosby Works, Ealing Road, Wembley, Middlesex, comprises a large capacity dripwell, porous ceramic cartridge type filter, accurate pressure reducing valve, and safety relief valve, all in one compact lightweight unit.

An outlet pressure gauge can be supplied fitted when necessary, and, if required, the outlet connexion can be orientated in three alternative positions.

Elimination of alignment problems has resulted in a remarkably flat pressure/flow curve over a very wide range.

Protective Aprons

James North & Sons Ltd, Kirkham House, 54A Tottenham Court Road, London, W.1, announce the introduction of a new range of pvc aprons which are fat and oil resistant, as well as providing protection from chemicals, abrasion, etc.

These new aprons should have wide applications in engineering, since laboratory tests and trials conducted by industrial concerns indicate increased resistance to certain chemicals and oils as compared with a normal pvc apron.

Formation of Compressed Air Drilling Equipment Firm

The formation has recently been announced of the Air Power Division of Joy-Sullivan Ltd, the U.K. subsidiary of the Joy Manufacturing Co. of Pittsburgh, U.S.A.

Joy-Sullivan Ltd was founded in its present form in the U.K. in 1948, its range of products include exploratory, seismic, blast hole, and water well drilling rigs (both rotary and percussion), and large oil well drilling rig equipment.

After detailed survey of the general potentials of the market it was decided that compressors and compressed-air driven equipment for civil engineering, quarrying, and metal mining offer the best potential for the future in the mining field, particularly in the export market.

New equipment now available from the Division, at 7 Harley Street, London, W.1, includes the WNO-112 oil-free compressor for the food and chemical industries, the *Airvane* RP365 rotary portable compressor with built-in safety circuit, and *Speedline* rock drills for wet or dry drilling.

Another subsidiary of the U.S. parent, the Baash-Ross Tool Co., has been operating in the U.K. for some years.

Equipment for Visual Inspection

A booklet showing the types of equipment and services available from P. W. Allen & Co, 253 Liverpool Road, London, N.1, for visual inspection and observation, is now obtainable.

The range includes examples of the Company's products in work and inspection lights; special purpose magnifiers and viewers; inside inspection and remote viewing equipment; and custom-built lighting and optical equipment.

First Full-View Masts from U.K.

The first Ideco-Woodfield Full-View mast, which was built at Rochester, England, in the latter end of 1958, is now operating in Kuwait. Known as the 98-ft Junior Full-View mast, this well-known design has been made available for sterling payment by reason of the licence held by Woodfield Rochester Ltd for the sale and manufacture of Ideco Oilfield Equipment in the United Kingdom.

Well over 300 Full-View masts are in service throughout the world, and operators generally are agreed that this design provides many important features not incorporated in any other mast of this type.

"Full-View" is that offered to the driller, who has unobstructed view of the derrick man and travelling block, thus creating safer conditions and allowing a faster round trip.

The unique raising mechanism produces such a nominal line pull that even a single-engine drawworks can perform the operation. Most important of all—the mast does not go over centre when erected, a fact which is unique amongst other designs not incorporating this feature, and which has caused many accidents. There is no free fall at the top of the erecting cycle due to this safety factor as the mast is under complete control at all times. The centre of gravity being on the pipe-rack side enables the mast to be lowered without having to jack or pull over *centre*.

Sunvic Pneumatic Selector Relay

A relay which will accept two signals in the 0-100 psi range and always pass the higher signal, has been added to the range of pneumatic relays produced by Sunvic Controls Ltd, Harlow, Essex. Known as the model 58S, it is intended to complement the Sunvic model 61F booster relay, which is a minimum auto-selector.

The model 58S relay will operate in temperatures from −40°F to + 180°F, and maximum operating pressure is 100 psi. As there is no retransmission, there is no time delay.

Cambridge Instrument Co's Head Office

With the acquisition of the lease of No. 14 Grosvenor Place, London, S.W.1, the Cambridge Instrument Company's headquarters have been extended from No. 13. The official address will remain 13 Grosvenor Place. The Publicity and Accounts Departments have moved back to the Company's head office and the premises at 60 Buckingham Palace Road have been vacated. No further correspondence should be addressed there.

Tecalemit Re-Design Oil Sprayer

Tecalemit Ltd, Plymouth, announce that they have redesigned their "Junior Penetrating Oil Sprayer." This sprayer, operated by an air pressure of 80-150 psi, and having a one-pint container, is now fitted with a tapered needle valve at the control handle, enabling the delivery to be more readily adjusted during operation without the need to use any tools.

The sprayer is available in addition to the "Giant Oil Sprayer" and the "Hand-Operated Sprayer".

Direct Injection Engine for Agriculture

The new four-cylinder direct-injection Perkins Four 270D for farm tractors and combine harvesters was recently exhibited at the Royal Show, Oxford.

The Four 270D, the first direct-injection engine to be put into production by the Peterborough firm, has the advantages of exceptionally low fuel consumption and particularly easy starting in cold weather.

The specific fuel consumption of 0·396 lb/hp/hr at 100 per cent full load is believed to be the lowest ever recorded, except for a tractor with a slow speed, horizontal, two-cylinder engine, which is not directly comparable.

Durgapur Steelworks Contract

Early in 1958, Baird & Tatlock (London) Ltd were appointed consultants to the Indian Steelworks Construction Co. Ltd (ISCON) for the laboratories for the £100 million steelworks which they are building in India.

The services comprise a coke oven, blast furnace, steel plant, coal washing, and water testing laboratories.

The Indian Steelworks Construction Co. Ltd, a consortium of thirteen British companies, is building the plant at Durgapur, in the Damodar Valley, West Bengal. The total cost of the steelworks is in the region of £100 million and it will have an initial output of approximately 20,000 tons of rolled products a week.

New UOP Chemical Products Development Department

Universal Oil Products Company has formed a new Chemical Products Development Department as part of its programme to intensify efforts in developing new chemical products, and enlarging its present product line for sale to the petroleum and other industries. In addition to refining catalysts, UOP manufactures corrosion inhibitors, fuel additives, rubber antiozonants, and antioxidants for food and other applications.

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Forthcoming Meetings

THE INSTITUTE

(*At* 61 *New Cavendish Street, London, W.*1., 5.30 *p.m.—tea* 5 *p.m.*)
Piston Ring Friction: Rig Measurement with Low Viscosity Oils. A. de Faro Barros and A. Dyson. **7 October**

IP LONDON BRANCH

(*At* 61 *New Cavendish Street, London, W.*1., 6 *p.m.—tea* 5.30 *p.m.*)
Technical Support for Marketing. Dr K. E. W. Ridler, B.Sc. **22 October**

IP SOUTH WALES BRANCH

(*At the Training Centre, BP Refinery (Llandarcy) Ltd,* 5.30 *p.m.*)
Looking Ahead. On the Threshold of our Second Century. H. E. Snow, C.B.E. **28 October**

INSTITUTION OF MECHANICAL ENGINEERS (AUTOMOBILE DIVISION)

(*At* 1 *Birdcage Walk, London, S.W.*1., 6 *p.m.—tea* 5.30 *p.m.*)
Engineering Challenges to American Automotive and Petroleum Research. Leonard Raymond, President SAE, Mem. A.S.M.E. **27 October**

THE SOCIETY FOR ANALYTICAL CHEMISTRY

(*At the Chemical Society, Burlington House, London, W.*1., 7 *p.m.*)
Atmospheric Pollution Analysis. **7 October**

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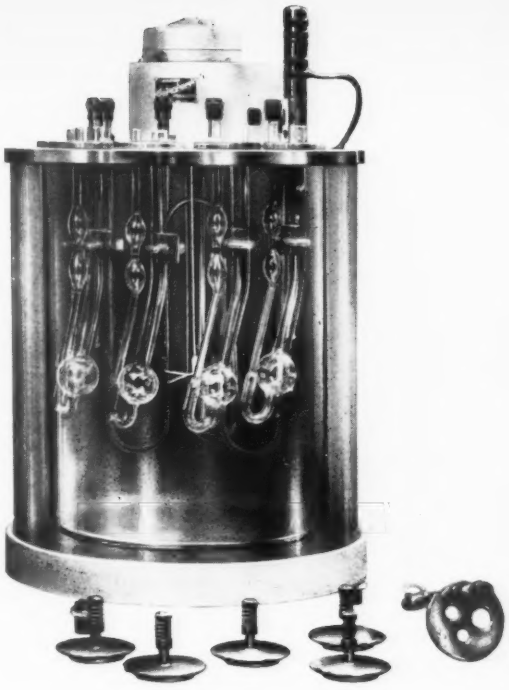

Two types are available, one being a single-walled glass vessel for a nominal maximum temperature of 100° F but capable of successful operation at 140° F. The other is double-walled, comprising one glass vessel inside another and designed for a maximum temperature of 210° F. This model can be used at lower temperatures, if required. Both can be fitted with a cooling coil for circulating a cooling liquid when the ambient temperature rises above the required setting. Five viscometers can be accommodated. Accuracy of control is within ± 0·025° F at all temperatures and approaches 0·01° F at 100° F.

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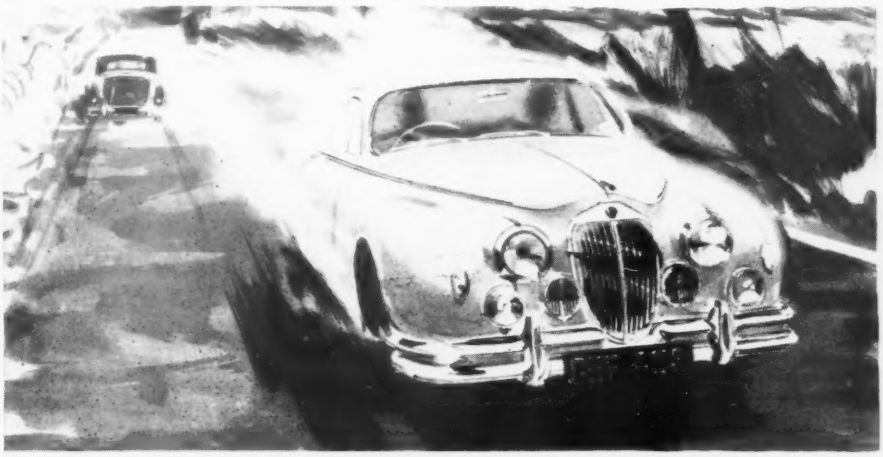

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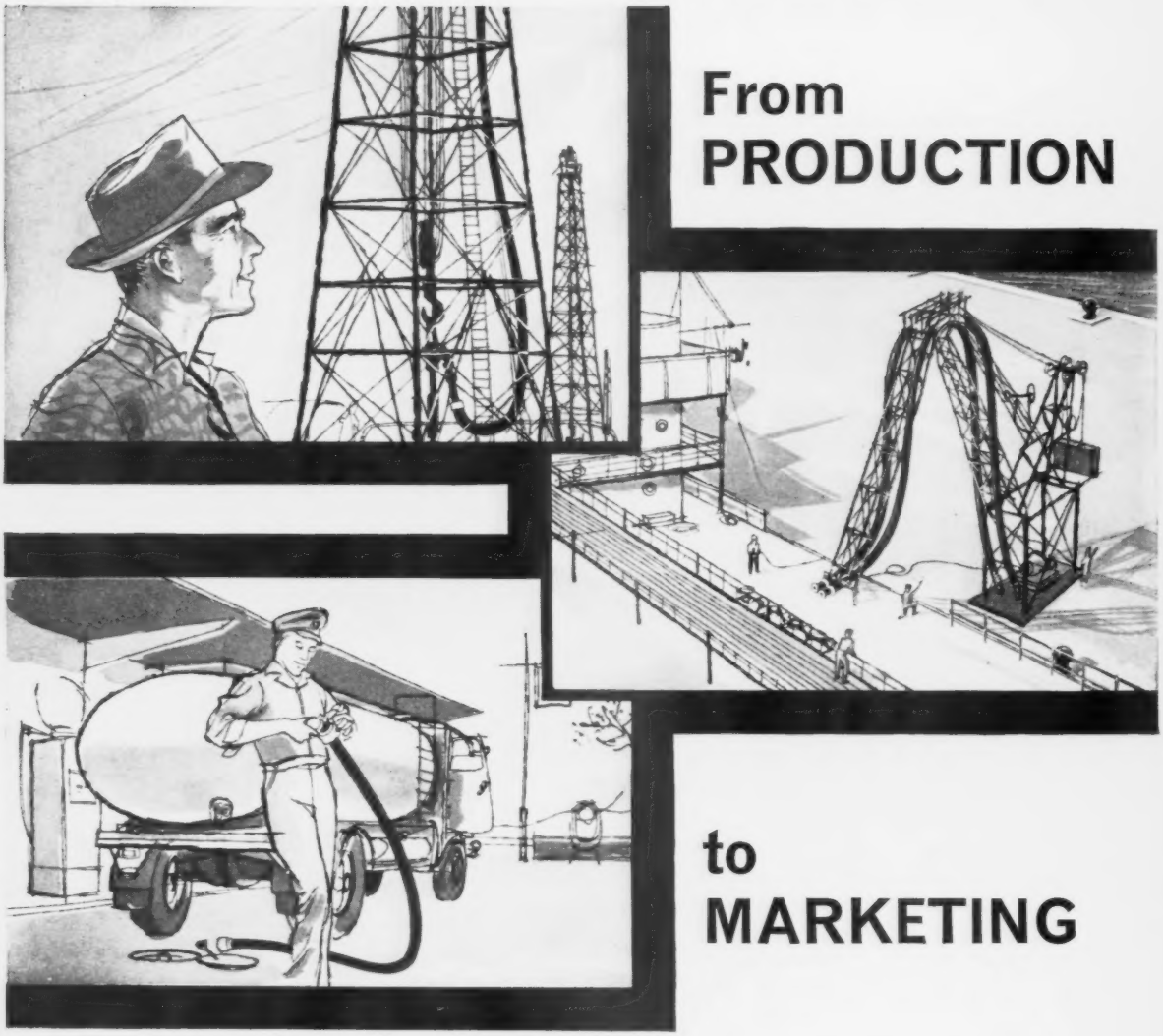

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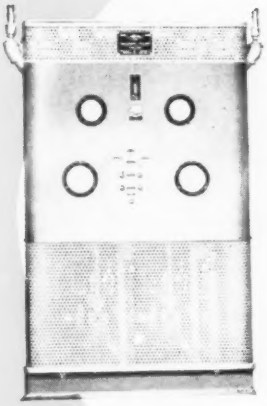

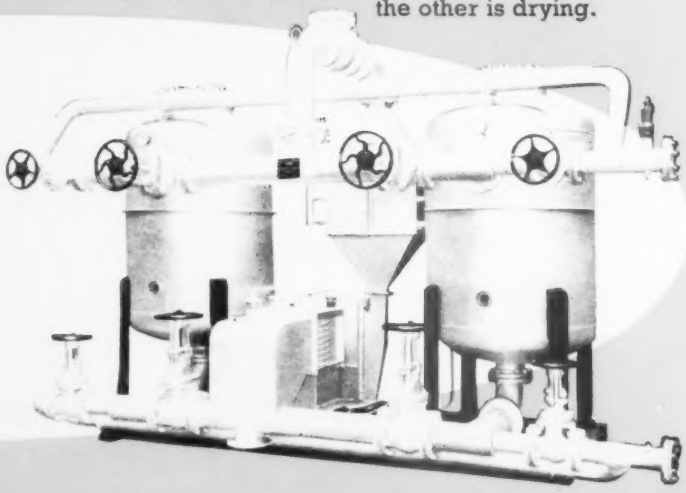

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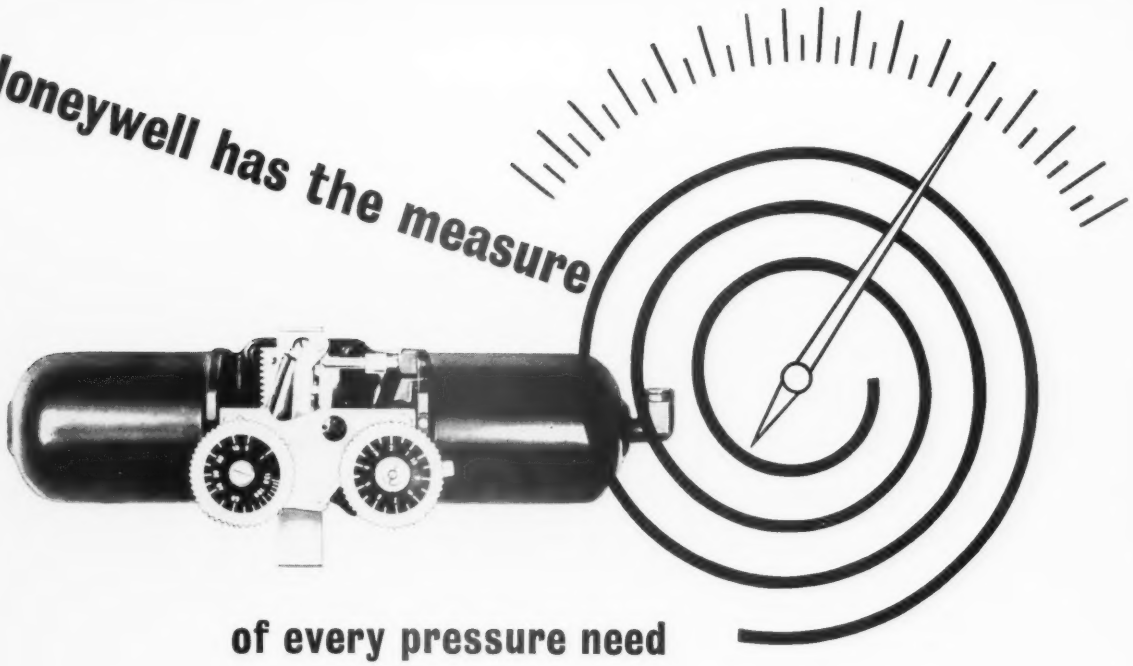

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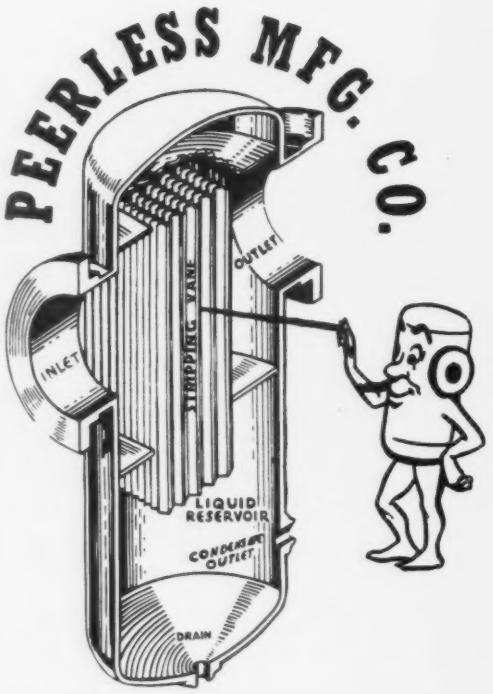

The drawing above shows the arrangement of the vanes in the Separator. The mist extractor combines the forces of impingement, centrifugal motion and surface tension to obtain its high efficiency. The path of the gas through the unit is constantly bending, causing semi-violent turbulence and rolling of the gas against the walls of the vane. Impingement and centrifugal force combine to contact the droplets with the vanes, where they coalesce, and surface tension causes them to adhere to the vane surface. Gravity and the impact of the gas stream then drive the droplets into the pockets, where they roll down the vanes and out of the gas stream.

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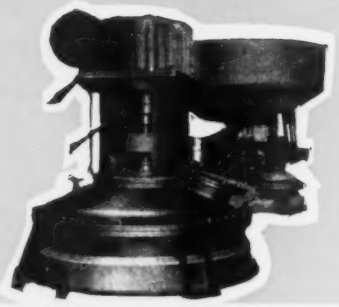

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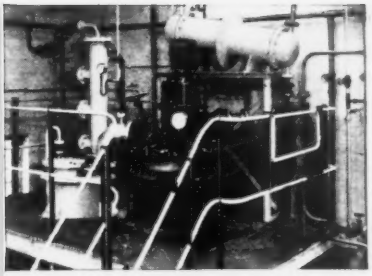
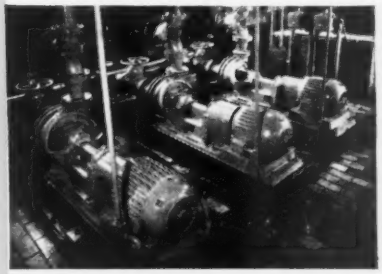
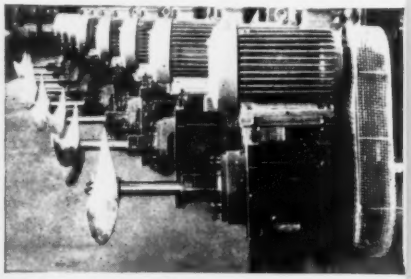


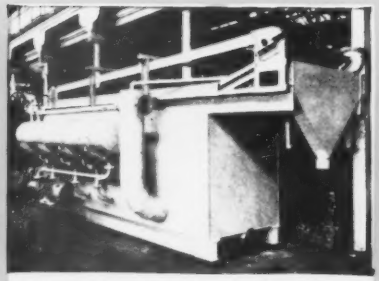
Resin making plant with electric induction heating.



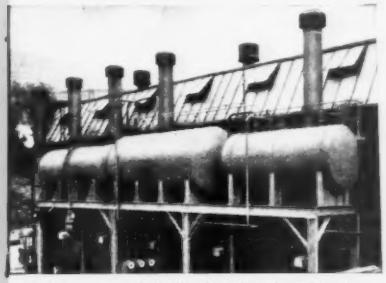
Battery of Mitchell centrifugal acid pumps in a rayon factory.



Battery of large side-entry mixers for petroleum blending.



Gibbs air flotation cell plant for the removal or recovery of greasy residues.



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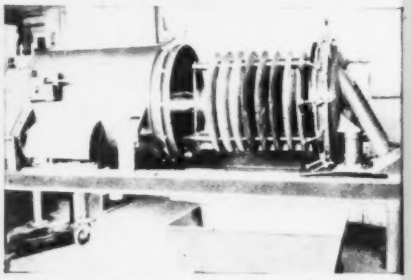

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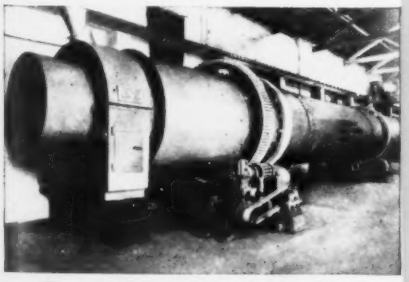

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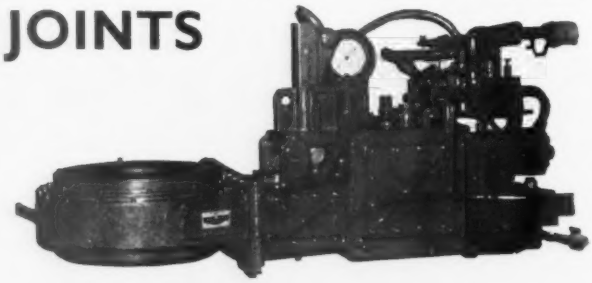

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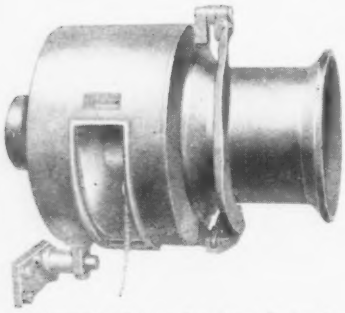

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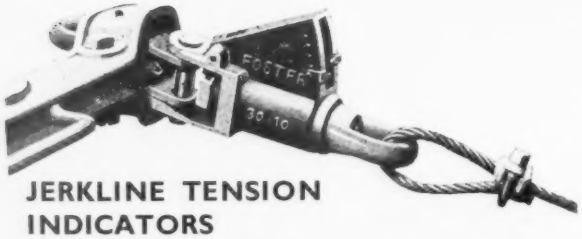

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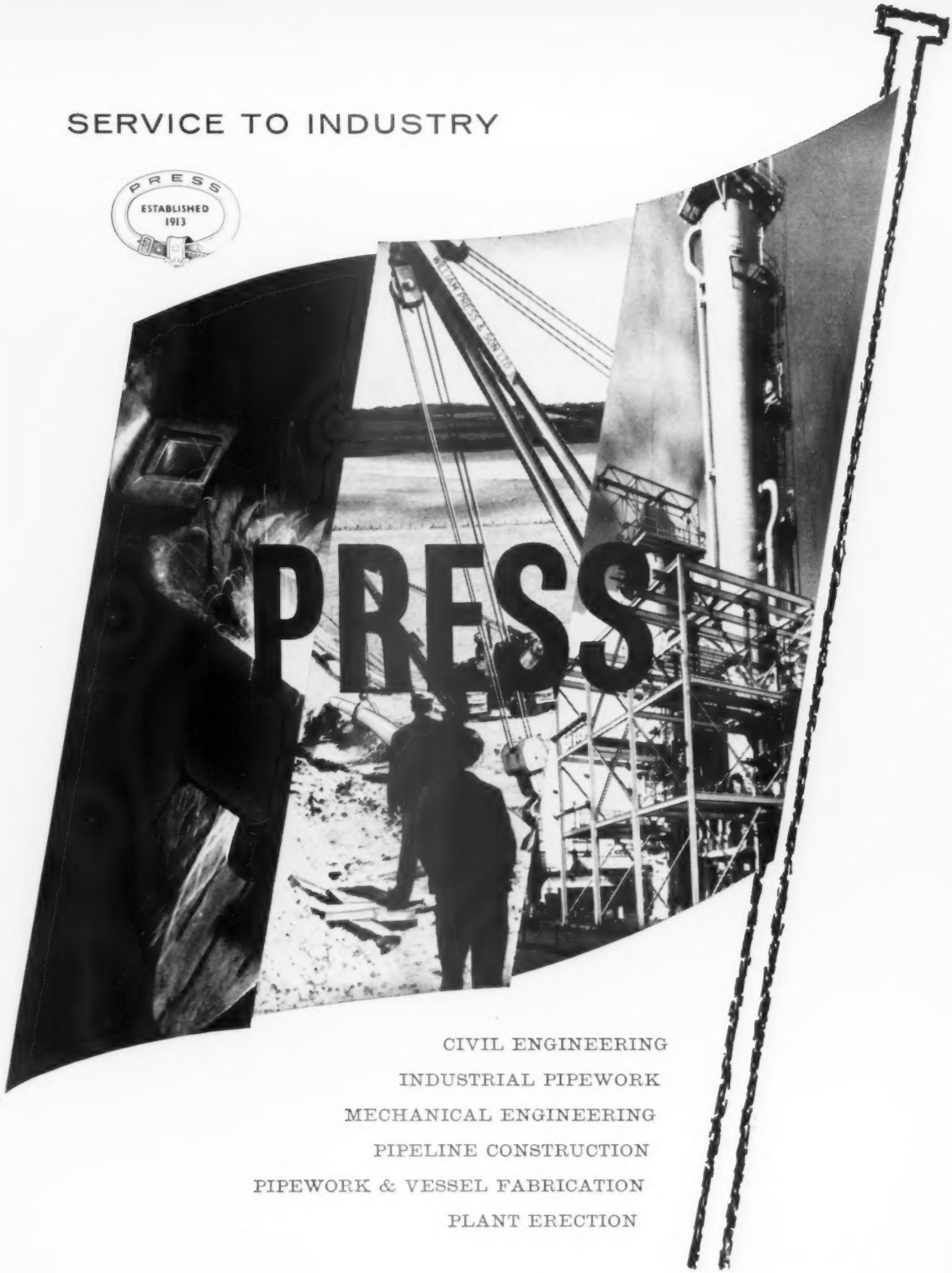

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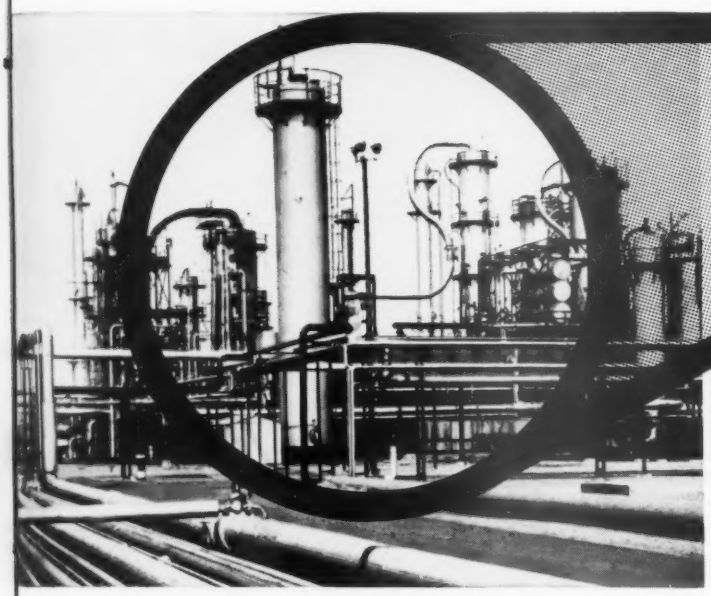

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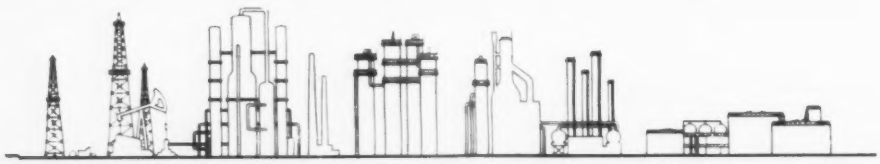

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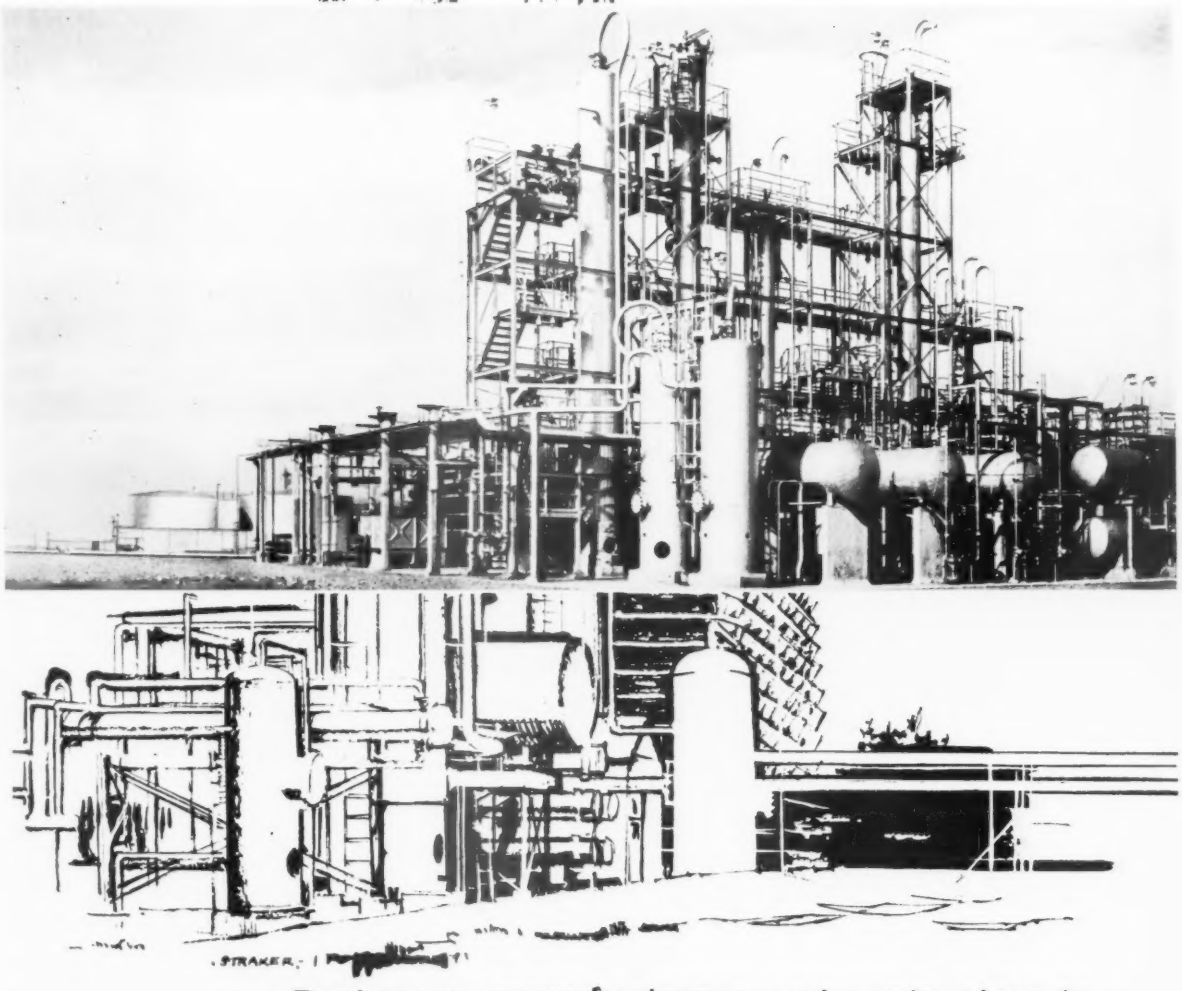

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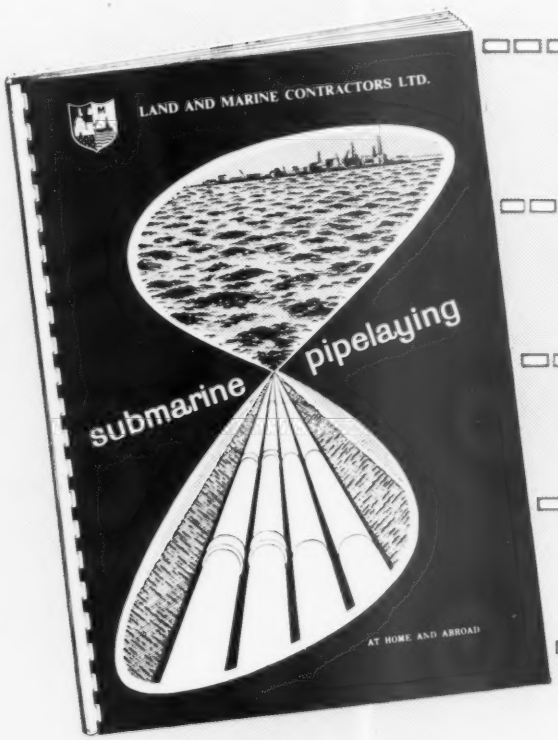

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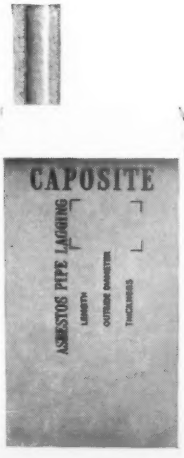

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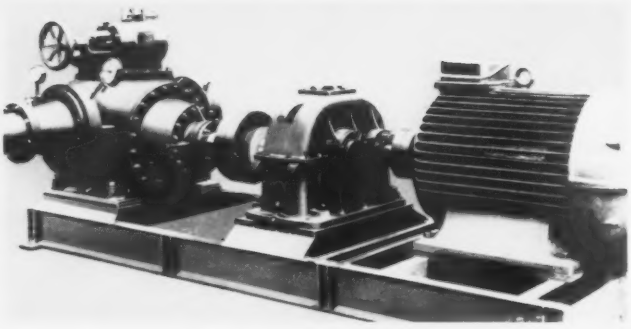

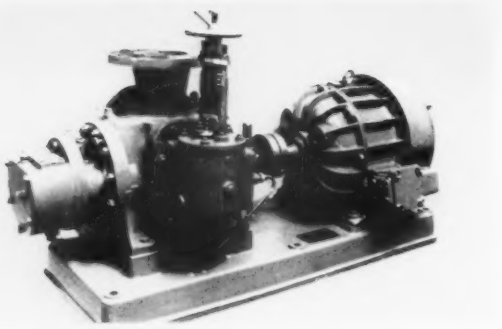

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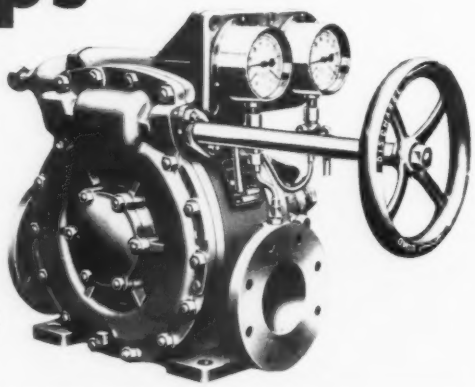

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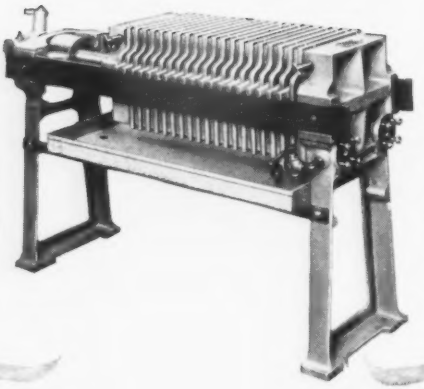

The illustration shows a cast iron 13 in. square "V" type filter press which is mainly used with filter cloths and filter papers as a polishing filter for oils, etc. Filter presses are also made in stainless steel, aluminium, gunmetal and timber in a variety of designs and are provided with suitable pumping machinery.

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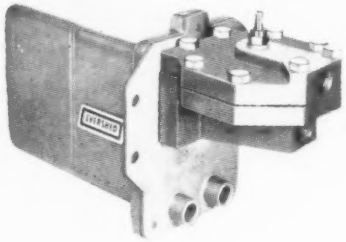

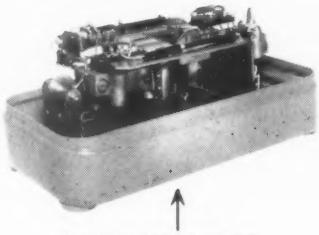

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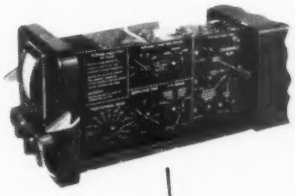

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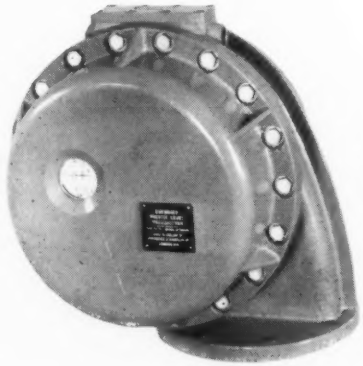

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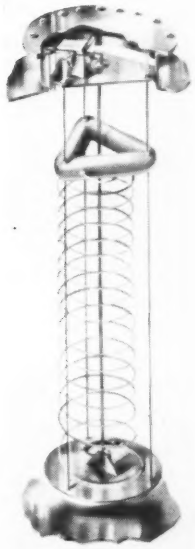

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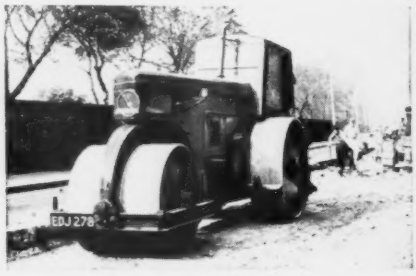

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TYPE	No. of Cyls.	Bore (ins.)	Stroke (ins.)	Swept Volume (cu.ins.)	Rating	R.P.M./GROSS B.H.P.							
						1000	1200	1500	1800	2000	2400	3000	3600
Four 99(I)	4	3	3½	99	A	10	12·7	16·8	21·3	24·2	29·2	34·8	—
					B	11	14	18·5	23·4	26·6	32·1	38·3	—
					C	11·3	14·3	19·1	24·2	27·5	33·1	39·5	42·3
P3/144(I)	3	3½	5	144	A	16·7	20·3	25·5	30	32·7	—	—	—
					B	18·4	22·4	28	33	36	—	—	—
					C	19	23	28·9	34·2	37·2	41·5	—	—
P4(I)	4	3½	5	192	A	22	26·9	33·5	40	43·6	—	—	—
					B	24·2	29·6	36·9	44	48	—	—	—
					C	25	30·5	38	45·5	50	55	—	—
Four 270D(I)	4	4½	4½	270	A	32·6	38·7	47	53	56·5	—	—	—
					B	35·8	42·5	51·5	58·4	62	—	—	—
P6(I)	6	3½	5	288	A	33·5	40·7	50·9	60	65·4	—	—	—
					B	36·9	44·8	56	66	72	—	—	—
					C	38	46	57·8	68·5	74·5	83	—	—
R6(I)	6	4	4½	340	A	37·5	46	58	67	69	—	—	—
					B	41·2	50·6	63·8	73·7	75·9	—	—	—
					C	44	53·5	68	81·4	89	102	—	—
S6(I)	6	4¼	5	450	A	49·4	61·8	80	95·9	104·9	—	—	—
					B	54·3	68	88	105·5	115·4	—	—	—
					C	56	70·1	90·7	108·8	119	—	—	—

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REMARKS

A. Denotes continuous rating to BS 649: 1958 conditions (85°F. and 29·5 hg). For every 10° above 85°F. this rating should be reduced by 2% and for every 1000 ft. above 500 ft. altitude the rating should be reduced by 3½%.
B. Denotes one hour rating to BS 649: 1958 conditions. See notes above re de-rating.
C. Denotes intermittent industrial rating to 60°F. and 30 ins. hg conditions. Similar de-ratings should be made for temperature and altitude conditions.

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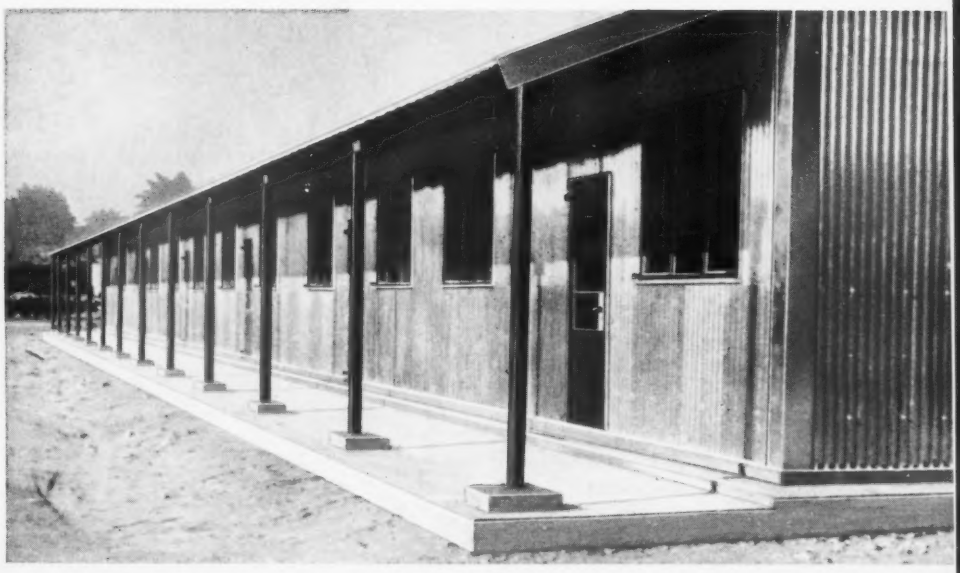
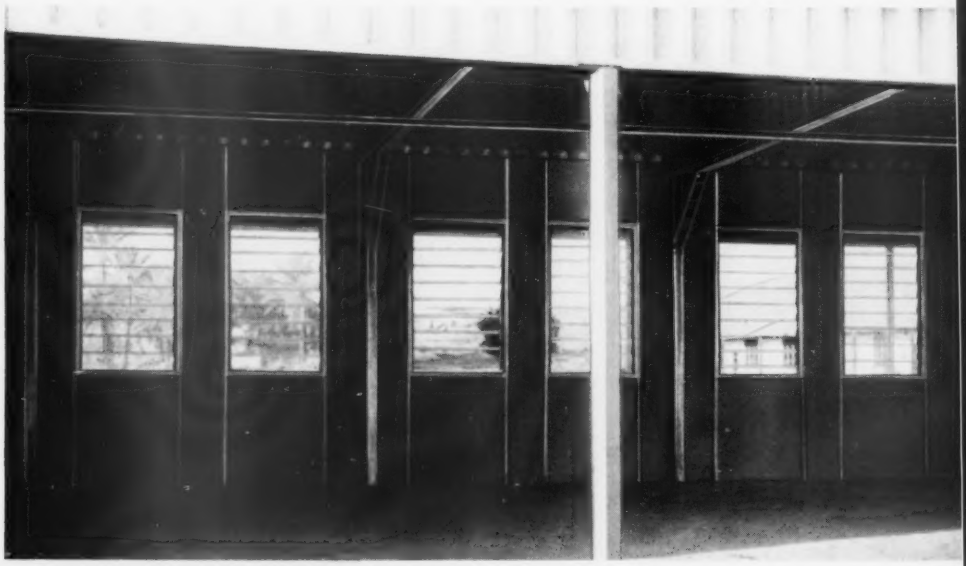


Over 150 buildings like these were supplied by Coseley for the tanker loading terminal construction camp at Kharg Island in the Persian Gulf. The dormitory building above is one of ten steel-framed buildings sheeted in aluminium, each 150 ft. long x 40 ft. span x 10 ft. to eaves. Below is an all-aluminium Kingstrand building, one of ten recreation shelters each 70 ft. long x 25 ft. span with an additional 5 ft. verandah. All the buildings were supplied within four months.



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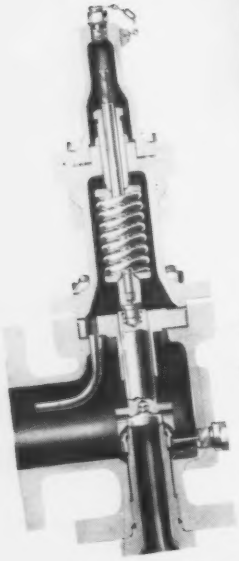

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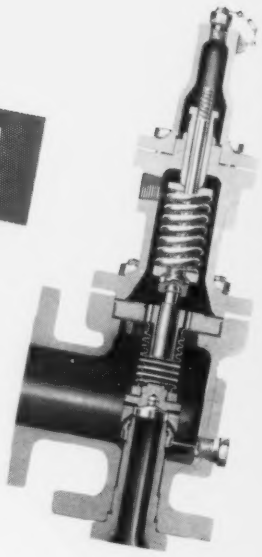

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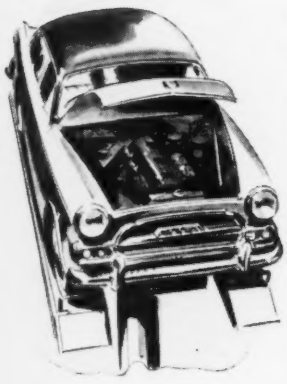

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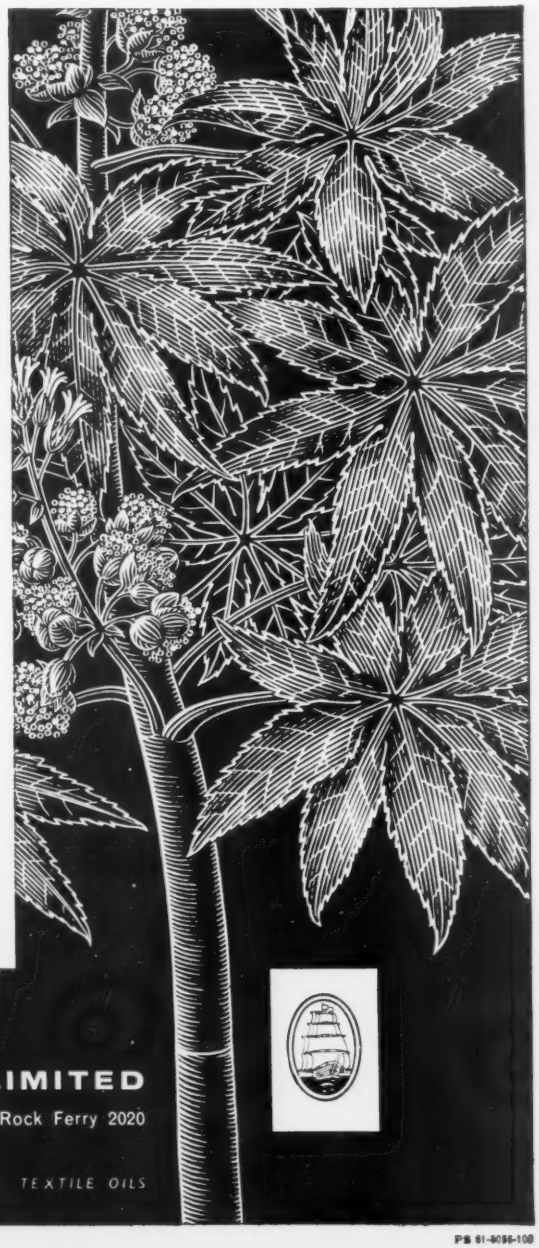

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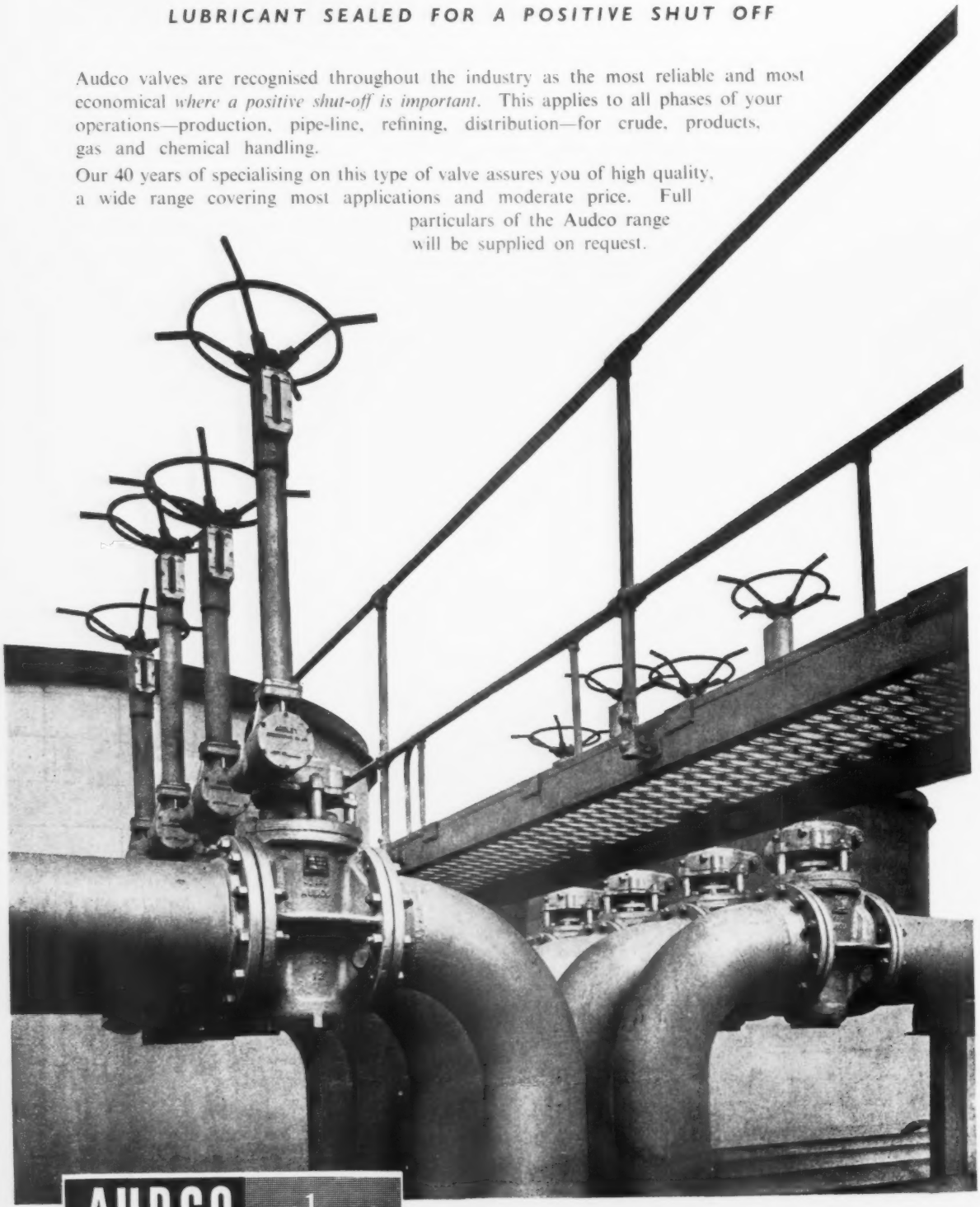

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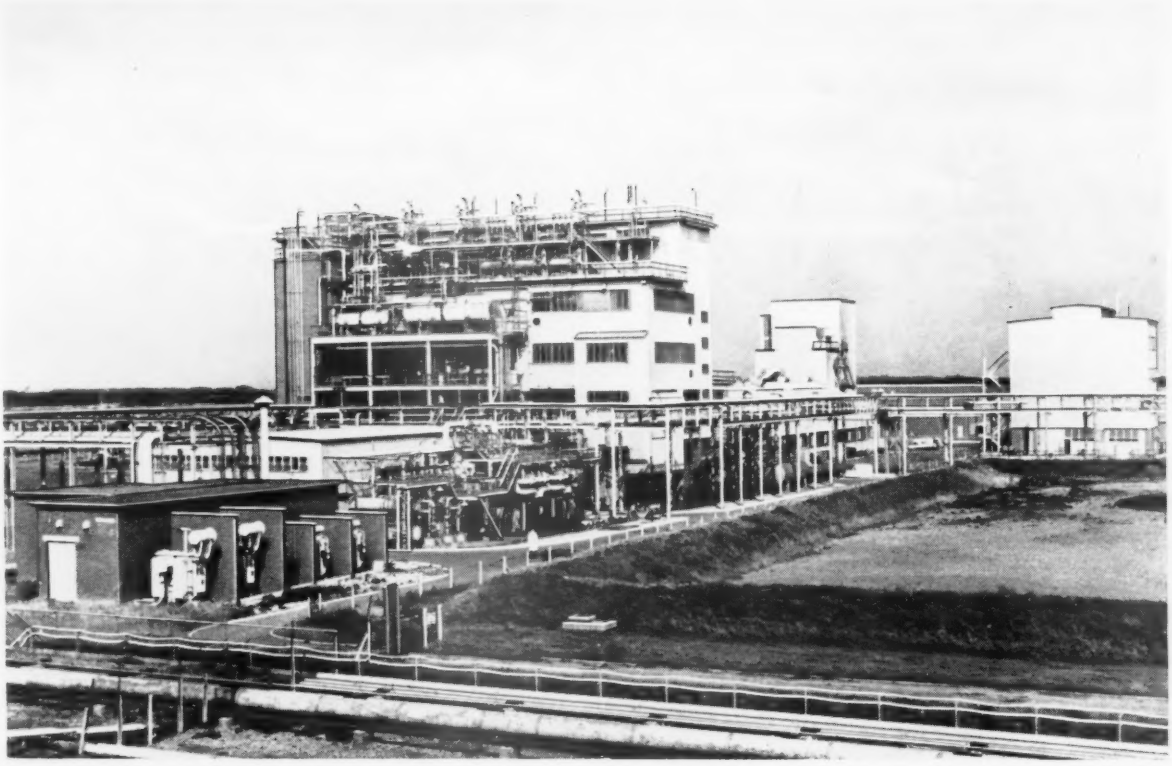

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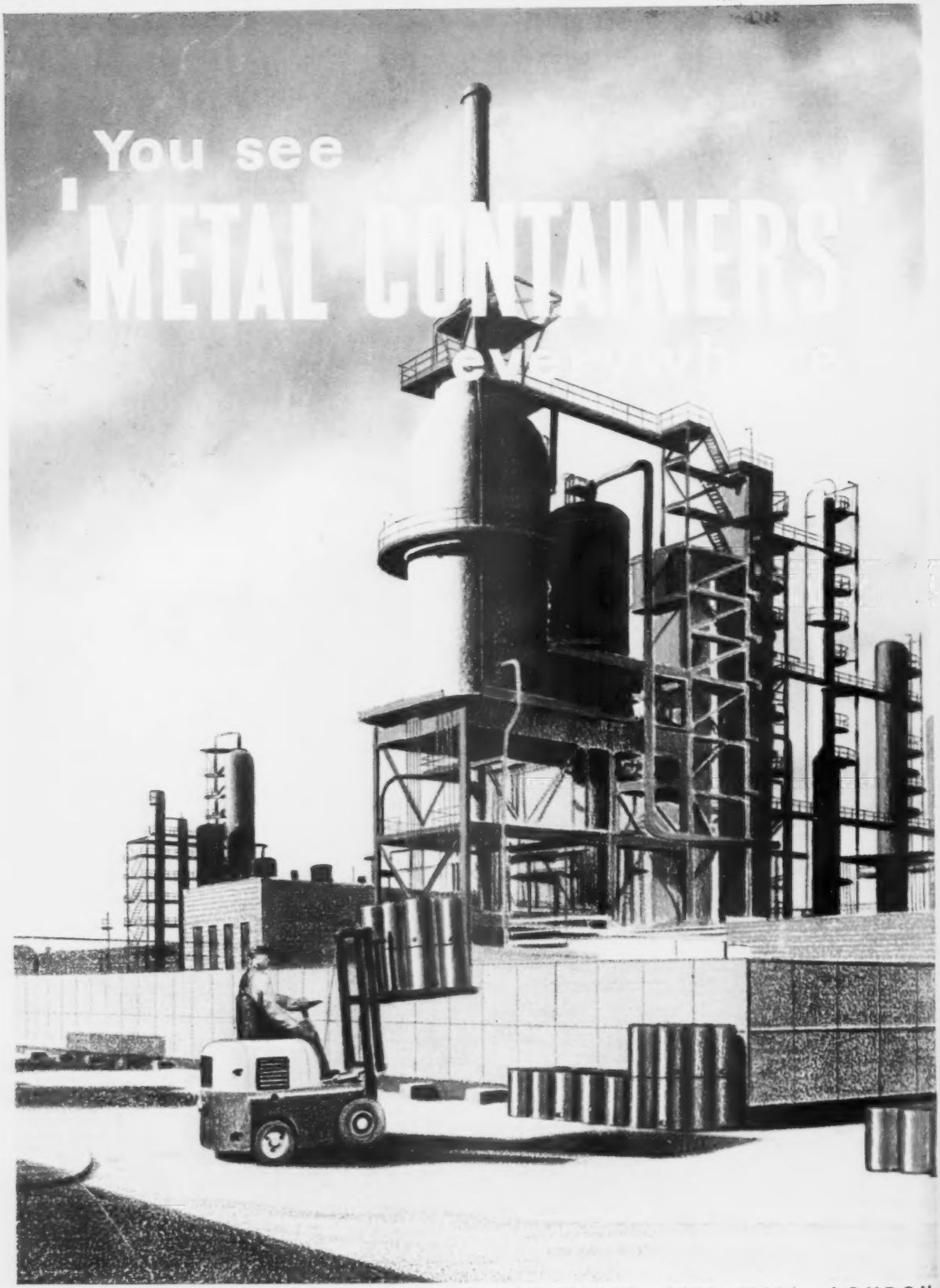

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